Overview of the National Residue Program Design

The USDA's Food Safety and Inspection Service (FSIS) obtains information on the occurrence of residues in meat, poultry, and egg products from two principal sources: the domestic and import scheduled sampling plans. The design of these sampling plans is detailed in this document, the FSIS National Residue Program (NRP), *Blue Book*.

The design of the domestic and import sampling plans begins with the generation of a list of residues that may occur in meat, poultry and egg products and that are of concern to human health. To develop this list, FSIS coordinates a meeting of the Surveillance Advisory Team (SAT). The SAT is an interagency committee comprised of members from the Environmental Protection Agency (EPA), the Food and Drug Administration (FDA), the Centers for Disease Control and Prevention (CDC), the Animal and Plant Health Inspection Service (APHIS), the Agricultural Marketing Service (AMS), the Agricultural Research Service (ARS), and FSIS. The SAT identifies the priority public health compounds of concern, and provides FSIS with detailed information about each compound. FSIS then combines this information with its historical data on compound violation rates to develop the domestic scheduled sampling, and the import residue plan. These sampling plans guide the allocation of FSIS laboratory and inspection resources.

Factors taken into consideration in developing the domestic and import scheduled sampling plans are:

- The overall estimated relative public health concern associated with each compound or compound class in meat, poultry, and egg products;
- The production or product classes in which each compound or compound class is likely to be of concern;
- The availability of analytical methods, which determines which compounds or compound classes can be analyzed; and
- The analytical capacity of the FSIS laboratories, which determines how many analyses of each compound or compound class can be performed.

The process used to design the import plan is similar to that of the domestic plans, with two important exceptions. First, since many countries ship processed products only, it is often not possible to test raw product at the U.S. port-of-entry. Further, even when raw product is shipped, it often consists of muscle tissue only. By contrast, domestic residue testing often is targeted towards organ tissues (typically kidney and liver). This is because many residues concentrate in organs, which makes them easier to detect. Because of this concentration effect, FDA often bases its tolerances for veterinary drugs upon the levels found in kidney or liver. Second, while countries are required to identify the animal species used in each product, they are not required to identify the production class. Testing on imported meat and poultry is subdivided by animal species (e.g., chicken vs. pig), and cannot be further subdivided within a species (e.g., steer vs. heifer vs. dairy cow. vs. formula-fed veal). Egg products, however, can be distinguished as a separate category.

Because different countries have different approved compounds and different use practices, the compounds analyzed in the import plan may not necessarily be the same as those in the domestic plan.

Design of the Domestic Scheduled Sampling Plan for Veterinary Drugs

I. Selecting and Ranking Candidate Veterinary Drugs

The candidate veterinary drugs of concern selected by members of the Surveillance Advisory Team (SAT) are presented below. Since FSIS prioritizes *analyses*, drugs that are, or are likely to be, detected by the same analytical methodology are grouped together. Some of the drugs are prohibited from extra label use in food animals under the Animal Medicinal Drug Use Clarification Act (AMDUCA). AMDUCA prohibited compounds are high regulatory priorities.

Antibiotics:

- At present, the following antibiotics are quantitated using the 7-plate bioassay[1] after a specific identification is made using mass spectroscopy (MS) or using high performance liquid chromatography (HPLC): tetracycline, oxytetracycline, chlortetracycline, gentamicin, streptomycin, dihydrostreptomycin, erythromycin, tylosin, neomycin, beta-lactams (quantitated as penicillin-G; penicillins and cephalosporins are not differentiated within this category), and tilmicosin (quantitated by HPLC). The following antimicrobials can be identified by MS; however, no quantitative methods are available: spectinomycin, hygromycin, amikacin, kanamycin, apramycin, tobramycin, lincomycin, pirlimycin, clindamycin, and oleandomycin
- Avoparcin (classification: glycopeptide; AMDUCA prohibited)
- Chloramphenicol (classification: antibiotic; AMDUCA prohibited)
- Florfenicol (classification: antibiotic; chloramphenicol derivative)
- Fluoroquinolones in FSIS MRM (classification: antibiotic; AMDUCA prohibited; compounds: ciprofloxacin, desethyleneciprofloxacin, danofloxacin, difloxacin, enrofloxacin, marbofloxacin, orbifloxacin, and sarafloxacin)
- Thiamphenicol (classification: antibiotic; chloramphenicol derivative)
- Vancomycin (classification: glycopeptide; AMDUCA prohibited)

Other Veterinary Drugs:

- Amprolium (classification: coccidiostat)
- Arsenicals (detected as elemental arsenic)
- Avermectins (classification: antiparasitics; compounds in FSIS MRM: doramectin, ivermectin, and moxidectin)

Benzimidazoles (classification: anthelmintics; compounds in FSIS MRM: thiabendazole and its 5-hydroxythiabendazole metabolite, albendazole 2-animosulfone metabolite, benomyl in the active hydrolyzed form carbendazim, oxfendazole, mebendazole, cambendazole, and fenbendazole)

- Berenil (classification: antiprotozoal)
- Carbadox (classification: antimicrobial)
- *beta*-Agonists (clenbuterol, cimaterol, and salbutamol; AMDUCA prohibited growth promotants[2])

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[1] FSIS quantitates most antibiotics using a 7-plate bioassay that measures microbial inhibition. The pattern of inhibition (i.e., the combination of plates showing inhibition) is used to identify the antibiotic. There are some antibiotics, however, that share the same pattern of inhibition. For these antibiotics, it is necessary to undertake follow-up testing (High Performance Liquid Chromatography, HPLC, or mass spectrometry) to establish their identities, where such follow-up methodologies are available. Tetracycline, oxytetracycline, and chlortetracycline share patterns of inhibition and are individually identified by follow-up with the HPLC method for tetracyclines; tilmicosin, tylosin, lincomycin, clindamycin, erythromycin, and pirlimycin, which are individually identified by ion-trap LC/MS/MS. Tissues found to be positive for tilmicosin are quantitated by a NADA method using HPLC. Amikacin, apramycin, dihydrostreptomycin, gentamycin, hygromycin, kanamycin, neomycin, spectinomycin, streptomycin, and tobramycin are individually identified by ion-trap LC/MS/MS. Confirmation for sulfa drugs and flunixin are also provided by the residue chemistry section at the FSIS, Midwestern Laboratory.

[2]The screening test used by FSIS has been officially validated for clenbuterol (bovine and porcine) and has been extended to salbutamol and cimaterol (bovine). The method has also demonstrated the ability to detect other beta

- Ractopamine (classification: *beta*-agonist)
- Clorsulon (classification: anthelmintic)
- Dexamethasone (classification: glucocorticoid)
- Diethylstilbestrol (DES; AMDUCA prohibited synthetic hormone)
- Dipyrone (classification: NSAID[3])
- Eprinomectin (classification: antiparasitic; avermectin)
- Etodolac (classification: NSAID)
- Flunixin (classification: NSAID)
- Halofuginone (classification: antiprotozoal, coccidiostat)
- Hormones, naturally-occurring (17-β estradiol, progesterone, testosterone)
- Lasalocid (classification: coccidiostat)
- Levamisole (classification: anthelmintic)
- Melengestrol acetate (MGA; classification: synthetic hormone)
- Methyl prednisone (classification: glucocorticoid)
- Morantel and pyrantel (classification: anthelmintic)
- Nicarbazin (classification: coccidiostat)
- Nitrofurans (compounds: furazolidone, nitrofurazone; AMDUCA prohibited antimicrobials)
- Nitromidazoles (classification: antiprotozoals; compounds in FSIS MRM: dimetridazole, ipronidazole)
- Phenylbutazone (classification: NSAID)
- Prednisone (classification: glucocorticoid)
- Ronidazole (classification: antimicrobial; copound: nitroimidazole)
- Sulfonamides (classification: antimicrobials, and some are coccidiostats; compounds in FSIS MRM: sulfapyridine, sulfadiazine, sulfathiazole, sulfamerazine, sulfamethazine, sulfachlorpyridazine, sulfadoxine, sulfamethoxypyridazine, sulfaquinoxaline, sulfadimethoxine, sulfisoxazole, sulfacetamide, sulfamethoxazole, sulfamethizole, sulfanilamide, sulfaguanidine, sulfabromomethazine, sulfasalazine, sulfaethoxypyridazine, sulfaphenazole, and sulfatroxazole)
- Sulfanitran (classification: antibacterial, coccidiostat)[4]
- Thyreostats (compound: thiouracil)
- Trenbolone (classification: synthetic hormone)
- Veterinary tranquilizers (compounds in FSIS MRM: azaperone and its metabolite azaperol, xylazine, haloperidol, acetopromazine, propionylpromazine, and chlorpromazine)
- Zeranol (classification: synthetic hormone)

Drugs Banned from Extralabel use under AMDUCA

FDA has advised FSIS that drugs banned from extralabel use under AMDUCA, are of high public health concern. Therefore, these drugs are not evaluated for inclusion using the ranking formula presented below. Instead, all AMDUCA drugs are automatically assigned a high sampling priority, and are included in the NRP if methodologies and resources are available. AMDUCA drugs are listed in Table 2A, *Drugs Banned from Extralabel use under AMDUCA*.

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agonists, including ractopamine. The follow-up confirmatory method may detect several unapproved beta agonists, including the following: clenbuterol; cimaterol; fenoterol; mabuterol; salbutamol; brombuterol; and terbutaline.

[3] non-Steroidal anti-inflammatory drug

[4] FSIS, in consultation with FDA, has rotated sulfanitran out of the NRP for 2005.

Compound Scoring

Using a simple 4-point scale (4 = high; 3 = moderate; 2 = low; 1 = none), the SAT scored each of the above veterinary drugs or drug classes in each of the following categories:

- FSIS Historical Testing Information on Violations
- Regulatory Concern
- Lack of FSIS Testing Information on Violations
- Withdrawal Time
- Impact on New and Existing Human Disease
- Relative Number of Animals Treated
- Acute or Chronic Toxicity Concerns

Definitions of each of these categories, and the criteria used for scoring, appear at the end of this section in the "*Scoring Key for Veterinary Drugs, 2005 Domestic Residue Program*."

The results of the compound scoring process are presented in Table 1, *Scoring Table for Veterinary Drugs*.

Compound Ranking

1. Background

As stated above, FSIS employs techniques and principles from the field of risk assessment to obtain a ranking of the relative public health concern represented by each of the above candidate compounds or compound classes.

If FSIS were in possession of detailed historical data on the distribution of levels of each of the candidate compounds or compound classes in meat, poultry, and egg products, then that information could be combined with consumption data to estimate exposure. By combining these exposure data with toxicity information, risk is estimated for each compound or compound class from the following:

Risk = Exposure x Toxicity (Equation 1)
= Consumption x Residue Levels x Toxicity
= Consumption x Risk per Unit of Consumption

Given the limited resources available for this priority-setting effort, FSIS did not attempt to associate different degrees of risk with different amounts or percentages by which the tolerance or action level was exceeded. FSIS instead determined that the best available method for the measurement of relative toxicity is the tolerance or action level of a compound or compound class. *Specifically, the frequency of violation of a tolerance or action level is used as an indicator of the risk per unit of consumption of a product.*

The category, *FSIS Historical Testing Information on Violations* (Table 1), is based on the percent of tested carcasses found to have residues in excess of the tolerance or action level. This percentage is determined from data obtained from the FSIS domestic scheduled sampling program. Drug compounds were scored by two methods: (a) the maximum violation rate seen in any production class (averaged over 1994-2003); and (b) the maximum, for any class, of the violation rate (again, averaged over 1994-2003), but weighted by the size of the production class. The final score for each drug was assigned based on the

higher of these two scores.[5] Therefore, it can be seen from Equation 1 that the violation rate scores assigned in Table 1 represent a rough overall estimate of *relative* risk per unit of consumption.[6] However, for the many candidate compounds or compound classes of concern that have never been included in the FSIS NRP, data on violation rates are not available. It was therefore necessary to generate an estimate of the overall violation rate for each these untested compounds and compound classes.

2. Estimating the Violation Rate

"Regulatory Concern," "Withdrawal Time," and "Relative Number of Animals Treated" were chosen as scoring categories because it is expected that they are positively correlated with the violation rate. Therefore, they are expected to serve as predictors of violations in those compounds or compound classes for which no reliable historical testing information was available. As indicated in the *Scoring Key for Veterinary Drugs*, the category, "Regulatory Concern," was designed to predict the "likelihood of occurrence of violations, based on regulatory intelligence information about possible misuse." The category, "Withdrawal Time," is expected to correlate with "FSIS Historical Testing Information on Violations" because a longer withdrawal time is less likely to be properly observed. When a withdrawal time for a drug is not observed prior to slaughter, the carcass may contain violative levels of residues, since the time necessary for sufficient metabolism and elimination of the drug would not have passed. The category, "Relative Number of Animals Treated," is expected to correlate with "FSIS Historical Testing Information on Violations" simply because heavy compound use increases the likelihood of violations.

Violation rate data are available for selected compounds and compound classes. Using the scores assigned to these compounds and compound classes, it was possible to evaluate how well the above criteria were correlated. In an effort to impute values for the missing data, a linear regression model was applied. The dependent variable in this model is the category, "FSIS Historical Testing Information on Violations," while the only significant independent variable are the product of the scores for "Regulatory Concern" and "Relative Number of Animals Treated." A scatter plot for the dependent and independent variables is shown in Graph III, *Scatterplot for Violation Rate vs. the Product of Regulatory Concern times Number of Animals Treated*.

Table 1 lists 11 compounds or compound classes for which current, reliable data were available to score the category "FSIS Historical Testing Information on Violations," and 19 compounds or compound classes for which there were not. A least squares linear regression model, using the value of the independent variable from the 11 scored compounds or compound classes, was then used to predict scores in the category "FSIS Historical Testing Information on Violations" for the 19 compounds for which this information is not available. The following equation was derived:

$$Vp = 1.72 + 0.1 * (R*N) \qquad \text{(Equation 2)}$$

Vp = Predicted score for "FSIS Historical Testing Information on Violations"
N = score for "Relative Number of Animals Treated"

[5] For a more detailed explanation, refer the *Scoring Key for Veterinary Drugs*.

[6] While some consideration was given to the size of the production class in scoring "FSIS Historical Testing Information on Violations," no systematic weighting was applied to the scores in this category based upon consumption. Hence, the scores assigned to this category represent relative risk *per unit of consumption*, rather than relative risk. To obtain values for relative risk, the scores in this category must be multiplied by the consumption data for each individual production class. This calculation is implemented subsequently, in Phase IV, using Equation 6; the results are presented in Table 5.

R = score for “Regulatory Concern”
R*N = product of R and N.

This model is the result of using a stepwise regression with several possible independent variables. The independent variables available for the stepwise regression are:

- A score for Regulatory Concern (R)
- A score for Withdrawal Time (W)
- A score for Relative Number of Animals Treated (N)
- R^2
- W^2
- N^2
- The product of R and W
- The product of R and N
- The product of W and N.

No terms involving “Withdrawal Time” were included in the final equation since none were found to be significant factors in the regression model.

The model represented by Equation 2 was found to be insignificant at the standard 0.05 level. The overall model p-value is 0.1887 and the R^2 value is 0.18, which accounts for 18 percent of the variability in the data. The trend for this model (1999-2004) has been for the R^2 value to drop; overall the model has become less significant to the point where it is not significant.

Where current, reliable historical testing data are available for a compound or compound class, FSIS used the score assigned in Table 1. Where current, reliable historical data were not available, FSIS used the predicted score generated by Equation 2.

3. Rating the Veterinary Drugs According to Relative Public Health Concern

As indicated above, the score for the category, "FSIS Historical Testing Information on Violations," combines information on residue levels and toxicity, and thus represents a rough overall estimate of the relative risk per unit of consumption for each drug or drug class. This score, once multiplied by relative consumption data for each production class, yields a purely risk-based ranking. In addition to historical violation data, FSIS includes scores for acute and chronic toxicity concerns, impact on new and existing human disease and lack of testing information on violations as parameters for the relative public health concern calculation. The general form of the calculation is given in Equation 3 and the scores for relative public health concern are summarized in Table 1.

Relative Public Health Concern = *Predicted* or *Actual* score for "FSIS Historical Testing Information on Violations" (Estimate of Relative Hazard) multiplied by: Equation 3

- a *modifier for* "Acute or Chronic Toxicity Concerns;"
- a *modifier for* "Impact on New and Existing Human Disease;" and
- a *modifier for* "Lack of FSIS Testing Information on Violations."

A drug violation means that a compound was found at a level where the likelihood of a toxic effect exceeds the Food and Drug Administration's (FDA's) standards. However, this does not address the *severity* of the effect associated with the toxic endpoint. To capture this concern FSIS has added the

category "Acute or Chronic Toxicity Concerns." Compounds in this category that have the highest degree of human toxicity receive the highest score.

The category, "Impact on New and Existing Human Disease," represents the extent to which the use or misuse of a compound will contribute to new and existing human disease. For example, there is a possibility that the creation of antibiotic-resistant human pathogens may result from the use of antibiotics in animals. This represents a potential public health concern that is not captured by the violation rate.

Finally, the category, "Lack of FSIS Testing Information on Violations," has been incorporated because violation data for a compound may be absent, dated or sparse. The lack of test information increases the relative public health need to obtain information on residue violations for a compound or compound class. For example, consider two hypothetical compounds, A and B. Compound A has been tested extensively and has a measured violation rate; however, there are no test data for compound B. Since there are no test data for B, a violation rate is calculated. If the measured violation rate for A and the calculated rate for B are identical and if their scores for the categories "Regulatory Concern," "Withdrawal Time," and "Number of animals treated" are also identical, FSIS believes there is greater need to sample for B than for A, because there is extensive information on A, but not for B.

The categories for acute and chronic toxicity concerns, impact on new and existing human disease and lack of testing information on violations introduces an element of arbitrariness into the calculation for the relative public health concern because there are no fundamentally "correct" assumptions for the appropriate weight that should be given to each. FSIS considered several possible sets of weighting factors for use in Equation 3. The various formulas that were considered differed principally in the relative weights given to the categories, "Acute or Chronic Toxicity Concerns" versus "Impact on New and Existing Human Disease," and in the magnitude of the calculated value for "Lack of FSIS Testing Information on Violations." FSIS selected the formula shown in the column for "Relative Public Health Concern Score" in Table 1. The selection is based on a consensus by the SAT about the relative importance of each category, and how much each category should be allowed to alter the underlying risk-based score, "V," in Equation 4. In this formula, the score for "FSIS Historical Testing Information on Violations" has been multiplied by a weighted average of the categories for "Acute or Chronic Toxicity Concerns" and "Impact on New and Existing Human Disease." These last two categories were combined because they both represent the negative potential public health effects associated with the use of a compound or compound class. The product of the above categories was then multiplied by a modifier for "Lack of FSIS Testing Information on Violations." The selected formula formalizes the basis of FSIS's judgment for relative public health concern for each compound and enables others to observe and understand the adjustments that were made. It also ensures consistency in how these adjustments were applied across a wide range of compounds. Equation 4 summarizes the way final adjustments were made.

Relative public health concern, R, rating for veterinary drugs:

$$R = V*((D+3*T)/4) *\{1+[(L-1)*0.05]\} \qquad \text{Equation 4}$$

V = *Predicted* or *Actual* score for "FSIS Historical Testing Information on Violations"
D = score for "Impact on New and Existing Human Disease"
T = score for "Acute or Chronic Toxicity Concerns"
L = score for "Lack of FSIS Testing Information on Violations

In this formula, the category, "Acute or Chronic Toxicity Concerns," was given three times the weight of "Impact on New and Existing Human Disease," because the former represents known direct health effects, while the latter represents possible indirect health effects. Further, the final ratings of compounds

or compound classes receiving scores of 4, 3, 2, and 1 in "Lack of FSIS Testing Information on Violations" would be increased by 15%, 10%, 5%, and 0% respectively. In other words, the rating of a compound or compound class that had never been tested by FSIS (in the production classes and matrices of concern) would be increased by 15%, while the rating of one that had been recently tested by FSIS (again, in the production classes and matrices of concern) would remain unchanged.

The formulas used in this section for the veterinary drugs and in for the pesticides have been normalized to give the same maximum value. Because the formula for the pesticides uses scoring categories that are different from the veterinary drugs, their scores are not comparable in a quantitative sense. However, as a result of the normalization, the scores for the pesticides and veterinary drugs are comparable in magnitude which enables a rough comparison to be made between the two different categories of compounds.

In Table 2B, *Rank and Status for Veterinary Drugs*, the drugs are ranked by their rating scores, as generated using the above weighting formula. The scores presented in Table 2B enable FSIS to bring consistency, grounded in formal risk-based considerations, to its efforts to differentiate among a very diverse range of drugs and drug classes in a situation that is marked by minimal data on relative exposures**.** These rankings do not account for differences in exposure due to differences in overall consumption.[7] Data on relative consumption are applied subsequently, in Phase IV, when relative exposure values for each compound/production class (C/PC) pair are estimated.

II. Prioritizing Candidate Drugs

Once the ranking of the veterinary drugs was completed, the ranking scores for relative public health concern were used as criteria for selecting compounds and compound classes to include in the 2005 NRP and to determine which compounds and compound classes to include in the 2005 NRP based on the availability of laboratory resources.

The consensus of FSIS and FDA was that those compounds and compound classes ranked 11th or higher (out of a total of 30) represent a potential public health concern sufficient to justify their inclusion in the 2005 NRP. In addition, based on information from the field, FDA expressed an interest in having FSIS perform limited testing on three compounds that fell below the ranking of 11 or higher: veterinary tranquilizers (ranked 30th); ractopamine (ranked 27th) and MGA (ranked 26th).

Once the high-priority compounds and compound classes had been identified, it was necessary for FSIS to apply practical considerations to determine the compounds for which the Agency would sample. The principal consideration was the availability of laboratory resources, especially the availability of appropriate analytical methods within the FSIS laboratories. Based on these considerations, FSIS plans to schedule the following veterinary drugs in the 2005 NRP for domestic sampling:

- Antibiotics
- Avermectins
- *beta*-Agonists[8]
- Carbadox
- Chloramphenicol
- Florfenicol
- Melengestrol acetate (MGA)

[7] See footnote 4.

[8]See footnote 2.

- Phenylbutazone (NSAID)
- Phenylbutazone (ELISA)
- Ractopamine
- Sulfonamides
- Thyreostats
- Trenbolone
- Zeranol

In the 2005 NRP, FSIS will employ a number of analytical methodologies to characterize (identity and quantity) veterinary drug residues. The methodologies are effective for the analysis of individual compounds and there are also multi residue methods (MRM) for antibiotics, avermecitns, beta-agonists, and sulfonamides that distinguish individual compounds in a compound class.

Table 2 lists all of the original candidate veterinary drugs in rank order. This table specifies the compounds and compound classes that will be scheduled for domestic sampling in the 2005 NRP. For each highly ranked compound or compound class that is not included for domestic sampling in the 2005 NRP, a brief explanation of the reason for its exclusion is provided. This table will be used to identify future method development needs for veterinary drugs for the FSIS NRP.

III. Identifying Compound/Production Class (C/PC) Pairs

The SAT participants identify the production classes of concern for each of the drugs and drug classes to be included in the 2005 NRP. These determinations were based upon professional judgment of the likelihood of finding violations within each production class (information examined included use approvals, extent of use, evidence of misuse and, if available, past violation history), combined with the proportion of total domestic meat consumption each production class represented. The results are presented in Table 3, *Production Classes to be Considered for Each Veterinary Drug/Drug Class*. Compound/Production Class pairs included in the 2005 NRP are designated by a "●." Those C/PC pairs that are of regulatory concern, but that could not be included in the 2005 NRP because of laboratory resource constraints, are marked with a "○." Since all production classes will be sampled by the chlorinated hydrocarbon/chlorinated organophosphate (CHC/COP) method (see Pesticides), and since this method also detects phenylbutazone, the latter will, by default, likewise be sampled in all production classes. However, phenylbutazone is not of regulatory concern in all production classes. Those production classes in which phenylbutazone will be sampled, but where it is not of regulatory concern, are designated by a "❍" (i.e., these production classes will be sampled for phenylbutazone, but only because it is automatically detected through the CHC/COP methodology). In addition, FSIS has suspended scheduled testing for certain production classes in 2005; these are marked with a "■."

Production class nomenclature:

- Bulls are mature, intact male cattle;
- Beef cows are sexually mature female cattle of beef type, ordinarily having given birth to one or more calves;
- Dairy cows are sexually mature female cattle of dairy type, ordinarily having given birth to one or more calves;
- Heifers are young, female cattle that have not yet given birth to a calf;
- Steers are male cattle castrated before sexual maturity;
- Calves/veal definitions are under FSIS review;

- Market hogs are swine usually marketed near six months of age and 200 to 300 pounds live weight;
- Boars are mature swine showing male sexual characteristics;
- Stags are male swine castrated after they have reached sexual maturity;
- Sows are mature female swine ordinarily having given birth to one or more litters;
- Sheep include mature sheep with no distinction by gender;
- Lambs are generally defined as sheep younger than 14 months and having a break joint in at least one leg;
- Goats are of both sex and any age;
- Horses are of either sex or any age;
- Other livestock include bison, deer, elk, etc.;
- Young chickens include: broilers/fryers that are usually less than 10 weeks of age, roasting chickens are young chickens of either sex usually less than 12 weeks of age, and capons that are surgically neutered male chickens usually less than 8 months of age;
- Mature chickens are adult female chickens usually more than 10 months of age;
- Young turkeys include fryer/roaster turkeys that are either male or female and usually less than 12; weeks of age, and turkeys that are either male or female usually less than 6 months of age;
- Mature turkeys are of both sex and usually more than 15 months of age;
- Ducks are of both sex and any age;
- Geese are of both sex and any age;
- Other poultry include ratites (typically ostriches, emus and rheas), guineas, squabs (young, unfledged pigeons), adult pigeons, pheasants, grouse, partridge, quail etc.;
- Rabbits are any of several lagomorph mammals;
- Egg products are yolks, whites, or whole eggs after breaking and can be dried, frozen, or liquid.

IV. Allocation of Sampling Resources

"Full-Resource" Sampling

Table 4 lists the estimated consumption of each production class as a percentage of the total consumption of all the production classes in the table. To obtain these estimates, production data for animals (and egg products) that were presented for slaughter (or processing) in federally inspected establishments during calendar year 2003 were employed as a surrogate for consumption. The production data for calves were collected, collated and reported by FSIS, using the Automated Data Reporting System. The production data for all other production classes, including egg products, were collected by FSIS, and collated and reported by the National Agricultural Statistical Service. As shown in Equation 5, the estimated relative percent of consumption represented by each production class was obtained by dividing the estimated total annual U.S. domestic production (pounds dressed weight) for that class by the total poundage for all production classes that are listed in Table 4.3:

Percent Estimated Relative Percent of Domestic Consumption (ERC)

$$ERC = AP/TP \times 100 \qquad \text{Equation 5}$$

AP = Annual Production (dressed weight in pounds)
TP = Total Annual Production of all Production Classes

All calculations and results are presented in Table 4, *Estimated Relative Consumption, Domestically Produced Meat, Poultry, and Egg Products*.

FSIS has the analytical capability to sample production classes of concern for the following compounds and compound classes: antibiotics (by bioassay); arsenicals; avermectins; sulfonamides; and phenylbutazone (via the CHC/COP methodology). To establish a relative sampling priority for each compound-production class pair, the ranking score (as calculated in Table 1) was multiplied by the estimated relative percent of domestic consumption for each production class (as calculated in Table 5 and as presented in Table 4). The resulting priority score for compound-production class pairs is shown in tables 5 and 6 and is calculated as follows (Equation 6):

Priority Score (PS)

$$PS = CP \times RPC \qquad \text{Equation 6}$$

CP = compound priority score rating
RPC = relative percent consumption

Equation 6 is analogous to the equation used to estimate risk in Equation 1, in which risk per unit of consumption is multiplied by consumption. While the results of Equation 6 do not constitute an estimate of risk, they provide a numerical representation of the relative public health concern represented by each C/PC pair, and thus can be used to prioritize FSIS analytical sampling resources according to the latter. Note that the risk ranking provided by Equation 6 is based upon average consumption across the entire U.S. population, rather than upon maximally exposed individuals.

In Table 5, *Veterinary Drug Compound-Production Class Pairs, Sorted by Sampling Priority Score, "Full Resource" Sampling*, the calculation shown in Equation 6 has been carried out for the antibiotics, arsenicals, avermectins, and sulfonamides, for each production class in which the specified drug might appear (as indicated in Table 6). The compound-production class pairs were sorted by their sampling priority scores, and roughly divided into quartiles. Initially, compound-production class pairs in the first through fourth quartiles were assigned sampling numbers of 460, 300, 230, and 90, respectively. The cutoff scores for Relative Public Health Concern corresponding to each sampling level were as follows: > 84 = 460 samples; 5.54 – 47.66 = 300 samples; 0.2 – 2.68 = 230 samples; < 0.17 = 90 samples. These priority scores were combined with historical violation rate information for each individual compound-production class pair, information on laboratory sampling capacity, and the number of slaughter facilities to select, for each pairing, from among four different sampling options: very high regulatory concern (460 analyses/year); high regulatory concern (300 analyses/year); moderate regulatory concern (230 samples/year); low regulatory concern (90 samples/year). The larger sample sizes, which provide the greater chance of detecting violations, are directed towards those compound-production class pairs that have been identified as representing higher levels of relative public health concern. Statistically, if v is the true violation rate in the population and n is the number of samples, the probability, P, of finding at least one violation among the n samples (assuming random sampling) is: $P = 1-(1-v)^n$. Therefore, if the true violation rate is 1%, the probabilities of detecting at least one violation with sampling levels of 460, 300, 230, and 90 are 99%, 95%, 90%, and 60%, respectively. The higher sampling levels are useful when FSIS wishes to schedule slaughter classes with somewhat lower violation rates (which is typically done for larger slaughter classes, since these represent a larger potential consumer exposure). For example, if the true violation rate is 0.5%, increasing the sampling level from 300 to 460 increases the chance of detecting a violation from 78% to 90%. By contrast, the lower sampling levels enable FSIS to ensure, without expending excessive resources that gross residue violation problems do not exist in minor slaughter classes. For example, while 90 samples offers only a 60% probability of violation detection at a violation rate of 1%, at a violation rate of 3% the detection probability increases to 94%.

Horses, rabbits, ratites, squab, geese, ducks, and bison will not be scheduled for the 2005 domestic scheduled sampling program for the 2005 NRP because the minor species are low production animals. However, horses are of concern for residue violations and inspector generated sampling will continue. Not scheduling the minor species will allow FSIS to focus those resources on the development of methodologies in areas that are of high public health concern.

Adjusting Relative Sampling Numbers

Adjusting for historical data on violation rates of individual C/PC pairs

As described above, FSIS uses "FSIS Historical Testing Information on Violations" as a critical factor in ranking the various drugs and drug classes according to their relative public health concern. Because this information is available for each production class individually, it can also be used to further refine the relative priority of sampling each C/PC pair. Table 6A, *Adjusted Number of Analyses for Each Veterinary Drug Compound/Production Class Pair, "Full Resource" Sampling*, lists the number of analyses assigned to each C/PC pair in Table 5. The table also reports the total number of samples analyzed in the FSIS scheduled sampling plan for the period 01/01/1994-12/31/2003, and the percent of samples found to be violative (i.e., present at a level in excess of the action level or regulatory tolerance; or, for those compounds that are prohibited, present at any detectable level) for each compound-production class pair. Using these data, the following rules were applied to adjust the sampling numbers:

- If less than 300 samples were tested in the FSIS scheduled sampling plan for a compound-production class pair (for the period 01/01/1994-12/31/2003), increase the sampling level by +1 level (e.g., from 230 samples to 300 samples).
- If the number of samples tested in the FSIS scheduled sampling plan for a compound-production class pair (for the period 01/01/1994-12/31/2003) was greater than or equal to 300 samples , and a violation rate of equal to or greater than 50%, and less than 70% ($\geq$ 0.50%, and < 0.70%) was found, increase the sampling level by +1 level.
- If at least 300 samples were tested in the FSIS scheduled sampling plan for a compound-production class pair (for the period 01/01/1994-12/31/2003), and a violation rate of greater than or equal to 70% ($\geq$ 0.70%) was found, increase the sampling level by +2 levels.
- If at least 300 samples tested in the FSIS scheduled sampling plan for a compound-production class pair (for the period 01/01/2001-12/31/2003), and a violation rate of 0.00% was found, rotate the C/PC pair out of the NRP. The compound-production class pair will be reintroduced at a later date.
- The maximum number of samples to be scheduled for testing is 460.

All of the above adjustments were applied, and the sampling numbers obtained following these adjustments are listed in Table 6A and 6B under the heading "Initial Adjustment" (initial adjusted number of samples).

Adjusting for laboratory capacity

After adjusting for historical data, it was necessary to make a final set of adjustments to match the total sampling numbers for each compound class with the analytical capabilities of the FSIS laboratories.

For avermecitns, it was decided to increase the number of scheduled samples in steers from 460 to 1000. The reason for the increase is that FSIS wants to establish a baseline violation rate for a single year, rather than a ten year period, for this compound-production class pair.

Adjustment for the Number of Slaughter Facilities

An adjustment to the total number of scheduled samples was made based on the number of production facilities. For this adjustment, FSIS considered the total number of production facilities (USDA Inspected Establishments for 2003) for each production class. If the total number of production facilities for a production class was found to be low relative to other production classes, the total number of scheduled samples was reduced for that production class. The number of samples selected for the reduction is based on FSIS professional judgment. If the number of facilities is less than 100, but greater than 10, the number of scheduled samples was adjusted down by 1 level. If the total number of facilities is less than 10, the number of scheduled samples was adjusted down by 2 levels. In either case, the total number of samples will not be reduced below 90. Based on these parameters, the number of scheduled samples was adjusted for the following production classes: “Formula-fed veal”, “Bob Veal”, “Young Turkeys”, “Mature Chickens”, and “Mature Turkeys.” No adjustment will be made for the minor species (horses, bison, ducks, rabbits, geese, squab, and ratites) since these production classes are suspended from testing for the 2005 NRP.

Adjustment for a zero (0%) violation rate for the three year period, 2001 – 2003

FSIS historical violation data were examined for the 2001 - 2003 production years. For compound slaughter class pairs that had a zero percent violation rate for the three year period, the number of scheduled samples was reduced to zero.

Final Adjustment

The total number of scheduled samples for compound-production class pairs were obtained following adjustments for laboratory capacity, production, and violation rate data are listed in Table 6, under the heading "Final Adjustment."

"Limited Resource" Sampling

The 2005 NRP includes a number of compounds for which FSIS does not have extensive sampling data. FSIS is concerned with obtaining information on their occurrence in production classes where it is suspected they might be of concern. To enable FSIS to sample this entire range of compounds, it is necessary to limit the number of samples taken per compound. In apportioning this "limited resource" sampling among the production classes of concern, it was particularly important to ensure that a sufficient number of samples be taken from each production class analyzed. If too few samples are taken from a production class, and no violations are detected, it would be difficult to interpret such a result. Where possible, a minimum of 300 analyses are scheduled in each production class to be sampled. This yields a 95% chance of detecting a violation, if the true violation rate is 1%. However, because of laboratory resource limitations, it is not always possible to sample at this level.

For the 2005 NRP, selection of production classes for the limited resource sampling for compounds (Table 6B) was made as follows:

- *beta*-Agonists (clenbuterol, cimaterol, and salbutamol) are of concern in steers, formula-fed veal, and market hogs. The analytical capacity for the *beta*-agonists in 2005 is 1,000 samples. FSIS will schedule 1,000 analyses for clenbuterol in steers for domestic sampling.

- Carbadox is of concern in market hogs. The analytical capacity is 300 samples for carbadox for the 2005 NRP. FSIS will schedule 300 analyses for carbadox in market hogs for domestic sampling.

- Chloramphenicol is of concern in dairy cows, formula-fed veal, non-formula-fed veal, young chickens, mature chickens, young turkeys, and mature turkeys. The analytical capacity is 1,094 samples for chloramphenicol for the 2005 NRP. FSIS will schedule 1,094 analyses for chloramphenicol for dairy cows, formula-fed veal, non-formula-fed veal, young chickens, mature chickens, young turkeys, and mature turkeys for domestic and import sampling.

- Florfenicol is of concern in dairy cows, formula-fed veal, and non-formula-fed veal. The analytical capacity is 410 samples for florfenicol for the 2005 NRP. FSIS will schedule 410 analyses for florfenicol in dairy cows, formula-fed veal, and non-formula-fed veal for domestic sampling.

- Melengestrol Acetate (MGA) is of concern in heifers, steers, formula-fed veal, and non-formula-fed veal. The analytical capacity for MGA in 2005 is 300 samples, and the top priority production class is heifers. FSIS will schedule 300 analyses for MGA in heifers for domestic sampling.

- Phenylbutazone is of concern in steers. The analytical capacity for phenylbutazone is 1,000 samples in the 2005 NRP. FSIS will schedule 1,000 analyses for phenylbutazone in steers for domestic sampling.

- Ractopamine is of concern in steers, formula-fed veal, and market hogs. The analytical capacity for ractopamine in the 2005 NRP is 410 samples. FSIS will schedule 410 analyses for ractopamine in steers, formula-fed veal, and market hogs for domestic and import sampling.

- Thyreostats are of concern in steers and heifers. The analytical capacity for thyreostats in 2005 is 600 samples. FSIS will schedule 600 analyses for thyreostats

- Trenbolone is of concern in formula-fed veal. The analytical capacity for trenbolone is 1,000 samples in 2005. FSIS will schedule 1,000 samples for trenbolone.

- Zeranol is of concern in formula-fed veal. The analytical capacity for zeranole is 1,000 samples in 2005. FSIS will schedule 1,000 samples for zeranol.

The above information is presented in tabular format at the end of the section, "Summary of Domestic and Import Sampling," in Table 49 *Detailed Sampling Plan, 2005 FSIS NRP, Domestic Scheduled Sampling and Specifically Designed Surveys*, Table 50, *Summary, 2005 FSIS NRP, Domestic Scheduled Sampling and Specifically Designed Surveys*, and in Table 54, *Combined Summary, 2005 FSIS NRP, Domestic and Import Scheduled Sampling, and Specifically Designed Surveys*.

V. Scoring Key

FSIS Historical Testing Information on Violations (01/01/1994 - 12/31/2003)

Violation rate scores were calculated by two different methods (see below), using violation rate data from FSIS random sampling of animals entering the food supply:

Method A: Maximum Violation Rate. Identify the production class exhibiting the highest average violation rate (the number of violations over the period from 1994 - 2003, divided by the total number of samples analyzed). Score as follows:

4 = > 0.70%
3 = 0.31% - 0.70 %
2 = 0.15% - 0.30%
1 = < 0.15%
NT = Not tested by FSIS
NA = Tested by FSIS, but violation information does not apply

Note that the above violation rate criteria are different from those used in planning the 1998 – 2002 NRP's. For previous NRP's the criteria were as follows: 4 = > 1.0%; 3 = 0.50% - 1.0 %; 2 = 0.15% - 0.49%; and 1 = < 0.15%. These new cutoffs permit FSIS to better distinguish between "high-violation" and "low-violation" slaughter classes.

Method B: Violation Rate Weighted by Size of Production Class. For each production class analyzed, multiply the average violation rate (defined above) by the relative consumption value for that class (weighted annual U.S. production for that class, divided by total production for all classes for which FSIS has regulatory responsibility). Add together the values for all production classes. Score as follows:

4 = > 0.15%
3 = 0.076% - 0.15%
2 = 0.01% - 0.075%
1 = < 0.01%
NT = Not tested by FSIS
NA = Tested by FSIS, but violation information does not apply

A final score is determined by assigning, to each drug or drug class, the greater of the scores from Method A and Method B.

It can be seen that Method A identifies those drugs that are of regulatory concern because they exhibit high violation rates, independent of the relative consumption value of the production class in which the violations have occurred. Method B identifies those drugs that may not have the highest violation rates, but would nevertheless be of concern because they exhibit moderate violation rates in a relatively large proportion of the U.S. meat supply. By employing methods A and B together, and assigning a final score based on the highest score received from each, both of the above concerns are captured.

Regulatory Concern

This consists of professional judgments made about the likelihood of occurrence of violations, based on regulatory intelligence information about possible misuse. Due to the public health significance of drug residue violations, information concerning a compound must meet only one of the requirements listed under each number below to receive that numerical ranking.

4 = Well-documented intelligence information gathered from a variety of reliable sources indicates possible widespread misuse of the compound, and/or this compound not approved for use in food animals in the U.S.

3 = Intelligence information gathered through a variety of sources indicates only occasional misuse of this compound. The dosage form/packaging of this compound has potential for misuse.

2 = Intelligence information rarely indicates misuse of this compound.

1 = Intelligence information has never indicated misuse of this compound.

Lack of FSIS Testing Information on Violations

This represents the extent to which FSIS analytical testing information on a residue is limited, absent or obsolete. Scores for lack of testing information are assigned as follows:

- A score of 4 for the following conditions:
    - FSIS has not included this compound in its sampling program within the past 10 years (1/1/1994 - 12/31/2003);
    - FSIS has included this compound within its program only between 6 and 10 years ago (1/1/1994 - 12/31/1998), but the sampling does not meet the criteria specified for a "3;"
    - FSIS has included this compound in its sampling program, but the information is not at all useful in predicting future violation rates, because of subsequent significant changes in the conditions of use of the compound (e.g., the reduction in withdrawal time for carbadox), or because regulatory intelligence information indicates that the situation has changed significantly since the last time the compound was sampled; or
    - Because the compound is of concern in several production classes of interest, but testing has been carried out in only one.

- A score of 3 for the following conditions:
    - FSIS has tested within the past 5 years (1/1/1998 - 12/31/2003), but in fewer than 75% of the production classes of interest;
    - If 75% of production classes were tested and there was no production class from which at least 300 samples have been analyzed;
    - The only testing was between 6 and 10 years ago, where FSIS has analyzed at least 75% of production classes of interest for at least 2 of these 5 years, with a total of at least 500 samples per production class during this 5-year period and, in the case of a multiresidue method (MRM), the method used covers all compounds of interest with the compound class;
    - A compound would normally have qualified for a "1" or "2," but the method used was not sufficiently sensitive to permit accurate determination of the true violation rate.

- A score of 2 for the following conditions:
    - FSIS has included this compound in its sampling program within the past 5 years in at least 75%, but less than 100% of the production classes of interest, with at least 300 samples in at least one production class; or

- 100% of the production classes of interest have been sampled, but the amount and duration of sampling has been insufficient to qualify for a "1."

- A score of 1 for the following conditions:

  - FSIS has included this compound in its sampling program within the past 5 years, and has analyzed 100% of the production classes of interest for at least 2 of these 5 years, with a total of at least 500 samples per production class during this 5-year period, and in the case of an MRM, the method used covers all compounds of interest with the compound class; or
  - FSIS has included this compound in its sampling program for at least 4 of the past 5 years, and at least 6,000 samples have been analyzed during this period.

Withdrawal Time

Producers using approved animal drugs are required to follow approved "conditions of use." For each drug, in each production class in which it is approved, the conditions of use specify the dosing regimen and the withdrawal time. The withdrawal time is the number of days that must pass between completion of the dosing regimen and the time of slaughter. This allows sufficient time for the concentration of drug in the animal to decrease below the tolerance. For approved drugs, the following scores were used:

- Score = 4, when the withdrawal time greater than 14 days;
- Score = 3, when the withdrawal time is between 8 and 14 days;
- Score = 2, when the withdrawal time is between 1 and 7 days; and
- Score = 1, when there is a zero-day withdrawal time

For unapproved drugs, scores in this category were assigned based on estimates of their half-lives.

Impact on New and Existing Human Disease

This represents the extent to which the use or misuse of a drug may contribute to new and existing human disease by changing the patterns of antibiotic resistance in human pathogens. A score for impact on new and existing human disease is determined as follows:

4= Scientific information gathered from a variety of reliable sources indicate that possible widespread use of this compound might significantly modify drug resistance patterns of human pathogenic organisms.

3 = Limited scientific information is available to suggest or document public health risk but compound has the potential to affect microflora.

2 = No scientific information available to suggest or document public health risk.

1 = Current scientific information available suggests no public health risk.

Relative Number of Animals Treated

These scores are based on economic data on doses sold, as well as surveys of treatment practices in animal populations that are representative of national feedlot, dairy, poultry, and swine production.

4 = Products containing this drug fall within the top third of those administered to animals treated within a particular category and dosage form of active ingredient.

3 = Products containing this drug fall within the middle third of those administered to animals treated within a particular category and dosage form of active ingredient.

2 = Products containing this drug fall within the bottom third of those administered to animals treated within a particular category and dosage form of active ingredient (but have more usage than products given a score of "1," as defined below).

1 = Products containing this drug are estimated to have extremely limited usage.

Note: Where data were unavailable, scores were estimated, based on comparison to related drugs with known usage levels. Numbers estimated in this way are contained within parentheses.

Acute or Chronic Toxicity Concerns

This represents a combination of the toxicity of the compound and the severity associated with the compound's toxic endpoint.

4 = Compound is a carcinogen, or potentially life threatening, or has significant acute effects including the anaphylactic response to an allergen.

3 = Systemic No Observed Effect Levels (NOEL's) seen at intermediate to low doses in laboratory test animals. Antimicrobial effects with a high potential to alter intestinal microflora.

2 = Systemic NOEL's seen at high oral doses in laboratory test animals. Antimicrobial effects with a moderate potential to alter intestinal microflora.

1 = Compound generally shows no toxicity in laboratory test animals even at doses much higher than present in edible tissues at zero-day withdrawal.

Table 1
Scoring Table for Veterinary Drugs
2005 FSIS NRP, Domestic Scheduled Sampling

Compound / Compound Class	Historical Testing Info. on Violations (FSIS) (V)	Regulatory Concern (CVM) (R)	Withdrawal Time (CVM) (W)	Relative Number Animals Treated (CVM) (N)	Predicted V = 0.1*(R*N) + 1.72	Predicted V, Except When Actual V is Available	Impact New & Existing Human Disease (CDC) (D)	Acute or Chronic Toxicity Concerns (CVM) (T)	Lack of Testing Info. on Violations (FSIS) (L)	Relative Public Health Concern Score = V*[(D+3*T)/4] *{1+[(L-1)*0.05]})
Antibiotics quantitated by the FSIS Bioassay MRM	4	4	4	4	3.32	4.00	3	4	1	15.00
Carbadox (antimicrobial)	3	4	4	3	2.92	3.00	3	4	3	12.38
Sulfonamides (antimicrobials, some are coccidiostats)	4	4	3	4	3.32	4.00	3	3	1	12.00
Florfenicol (chloramphenicol deriv.)	NT	3	4	4	2.92	2.92	3	3	4	10.07
Avermectins in FSIS MRM (incl. doramectin, ivermectin, moxidectin) (antiparasitics)	4	3	4	4	2.92	4.00	2	4	1	14.00
Arsenicals (detected as As)	3	4	2	4	3.32	3.00	3	2	1	6.75
Flunixin	3	4	2	3	2.92	3.00	1	2	3	5.78
Ractopamine (beta agonist)	1	4	2	3	2.92	1.00	2	3	3	3.03
Thyreostats (incl. thiouracil)	NT	4	3	1	2.12	2.12	2	4	4	8.53
Dipyrone (NSAID)	NT	4	3	1	2.12	2.12	1	4	4	7.92
Berenil (antiprotozoal, Histomonas)	NT	4	4	1	2.12	2.12	2	3	4	6.70
Trenbolone (hormone, synthetic)	NT	4	1	3	2.92	2.92	3	3	4	10.07
Zeranol (hormone, synthetic)	NT	3	1	3	2.62	2.62	3	3	4	9.04
Methyl prednisone (glucocorticoid)	NT	4	2	2	2.52	2.52	1	3	3	6.93
Eprinomectin (avermectin)	NT	2	2	3	2.32	2.32	2	2	4	5.34
Clorsulon (anthelmintic, Trematodes)	NT	2	3	2	2.12	2.12	2	2	4	4.88
Dexamethasone (glucocorticoid)	NA-O	4	2	2	2.52	2.52	1	3	4	7.25
Thiamphenicol (chloramphenacol derivative)	NT	3	2	1	2.02	2.02	3	3	4	6.97
Amprolium (coccidiostat)	NT	4	2	2	2.52	2.22	3	2	4	5.75
Hormones (naturally-occurring)	NT	2	1	4	2.52	1.97	2	2	4	4.54

Table 1 - *Continued*
Scoring Table for Veterinary Drugs
2005 FSIS NRP, Domestic Scheduled Sampling

Compound / Compound Class	Historical Testing Info. on Violations (FSIS) (V)	Regulatory Concern (CVM) (R)	Withdrawal Time (CVM) (W)	Relative Number Animals Treated (CVM) (N)	Predicted V = 0.1*(R*N) + 1.72	Predicted V, Except When Actual V is Available	Impact New & Existing Human Disease (CDC) (D)	Acute or Chronic Toxicity Concerns (CVM) (T)	Lack of Testing Info. on Violations (FSIS) (L)	Relative Public Health Concern Score = V*[(D+3*T)/4] *{1+[(L-1)*0.05]})
Lasalocid (coccidiostat)	NT	2	1	3	2.32	1.95	3	2	4	5.05
Melengestrol Acetate (MGA; synthetic hormone)	1	3	1	4	2.92	1.00	3	3	3	3.30
Levamisole (anthelmintic, Nematodes)	3	3	3	2	2.32	3.00	1	1	4	3.45
Prednisone (glucocorticoid)	NT	2	2	1	1.92	2.10	1	3	4	6.05
Etodolac (NSAID)	NT	3	2	1	2.02	2.12	1	3	3	5.84
Halofuginone (antiprotozoal, coccidiostat)	2	1	2	2	1.92	2.00	2	2	4	4.60
Benzimidazoles (anthelmintic)	NT	1	3	2	1.92	2.30	1	2	4	4.62
Veterinary tranquilizers	NT	4	2	2	2.52	2.22	1	1	4	2.56
Nicarbazin (coccidiostat)	NT	2	2	1	1.92	2.10	2	1	4	3.02
Morantel and pyrantel (anthelmintic)	2	1	1	2	1.92	2.00	2	1	4	2.88

Key:
MRM = multiresidue method
NT = not tested by FSIS (01/01/1994 - 12/31/2003)
NA-O = data are preliminary; useable data on this compound (i.e., data are not subject to any of the various problems listed immediately above) have been collected for only one year
FSIS = scores in this column supplied by FSIS
CVM = scores in this column supplied by CVM
CDC = scores in this column supplied by CDC.

Table 2A
Drugs Banned from Extralabel use under AMDUCA*
2005 FSIS NRP, Domestic Scheduled Sampling

AMDUCA Prohibited Drug	Status in the 2005 NRP
Chloramphenicol	Domestic: 230, 90, 90, 230, 90, 90, and 90 samples are scheduled for dairy cows, formula-fed veal, non-formula-fed veal, young chickens, mature chickens, young turkeys and mature turkeys, respectively. Import: 93 samples for fresh beef and 91 samples for fresh veal
Nitrofurans, including furazolidone and nitrofurazone (antimicrobials)	NIP
Clenbuterol**	Domestic: 1,000 samples are scheduled for steers. Confirmation done by FDA-NCTR Import: No samples scheduled for 2005
Fluoroquinolones	NIP
Ronidazole (nitroimidazole; antimicrobial use)	NIP
Nitroimidazoles (FSIS MRW: dimetridazole and ipronidazole; antiprotozoal use)	NIP
Avoparcin (glycopeptide)	NIP
Vancomycin (glycopeptide)	NIP
Diethylstilbestrol (DES; synthetic hormone)	NIP
Phenylbutazone (NSAID)	Domestic: 1,000 samples are scheduled for steers (by ELISA); 5,452 samples are scheduled as part of the CHC/COP MRM Import: No samples are scheduled for 2005

*Drugs banned from extralabel use under AMDUCA were not evaluated using the ranking formula for inclusion in Table 2A. Instead, these drugs were automatically assigned a high sampling priority and will be included in the NRP if methodologies and resources are available.

**The clenbuterol methodology employs a screen that has been officially validated for clenbuterol (bovine and porcine) and has been extended to salbutamol and cimaterol (bovine). The method has also demonstrated the ability to detect other beta agonists, including ractopamine. The follow-up confirmatory method may detect several unapproved beta agonists, including the following: clenbuterol; cimaterol; fenoterol; mabuterol; salbutamol; brombuterol; and terbutaline.

Table 2B
Rank and Status of Veterinary Drugs
2005 FSIS NRP, Domestic Scheduled Sampling

Rank	Drug	Score	Status in the 2005 NRP
1	Antibiotics At present, the following antibiotics are quantitated using the 7-plate bioassay after a specific identification is made using mass spectroscopy (MS) or using high performance liquid chromatography (HPLC): tetracycline, oxytetracycline, chlortetracycline, gentamicin, streptomycin, dihydrostreptomycin, erythromycin, tylosin, neomycin, beta-lactams (quantitated as penicillin-G; penicillins and cephalosporins are not differentiated within this category), and tilmicosin (quantitated by HPLC). The following antimicrobials can be identified by MS; however, no quantitative methods are available: spectinomycin, hygromycin, amikacin, kanamycin, apramycin, tobramycin, lincomycin, pirlimycin, clindamycin, and oleandomycin.	15.0	Domestic Scheduled Sampling: 300, 300, 90, 460, 300, 300, 300, 230, and 300 samples are scheduled for market hogs, dairy cows, formula-fed veal, heifers, bob veal, beef cows, sows, heavy calves, and non-formula-fed veal, respectively
			Imported: All fresh product classes.
2	Avermectins (antiparasitic doramectin, ivermectin, and moxidectin)	14.0	Domestic Scheduled Sampling: 300, 230, 300, 230, 90, and 90 samples are scheduled for bulls, lambs, goats, heavy calves, non-formula fed veal, and sheep production classes, respectively
			Imported: Beef, pork, veal, lamb/mutton fresh and lamb/mutton processed
3	Carbadox (antimicrobial)	12.4	Monitoring Plan: Not scheduled for 2005
			Special designed project: 300 samples are scheduled for roaster pigs
			Imported: Not scheduled for 2005
4	Sulfonamides in FSIS MRM (sulfapyridine, sulfadiazine, sulfathiazole, sulfamerazine, sulfamethazine, sulfachloropyridazine, sulfadoxine, sulfamethoxypyridazine, sulfaquinoxaline, sulfadimethoxine, sulfisoxazole, sulfacetamide, sulfamethoxazole, sulfamethizole, sulfanilamide, sulfaguanidine, sulfabromomethazine, sulfasalazine, sulfaethoxypyridazine, sulfaphenazole, and sulfatroxazole) (antimicrobials, some are coccidiostats)*****	12.0	Domestic Scheduled Sampling: All production classes except egg products, sows, mature chickens, bison, ducks, goats, ratites, geese, and squab
			Imported: All production classes
5	Florfenicol (chloramphenicol derivative)	10.1	Domestic Scheduled Sampling: 230, 90, and 90 samples for dairy cows, formula-fed veal, and non-formula-fed veal, respectively
			Imported: Not scheduled for 2005
6	Trenbolone	10.1	Domestic Scheduled Sampling: 1,000 samples are scheduled for formula-fed veal
			Imported: Not scheduled for 2005
7	Zeranol (hormone, synthetic)	9.0	Domestic Scheduled Sampling: 1,000 samples are scheduled for formula-fed veal
			Imported: Not scheduled for 2005
8	Thyreostats (incl. thiouracil)	8.5	Exploratory Project: 600 samples are scheduled for steers and for heifers.
			Imported: Not scheduled for 2005

Table 2B - *continued*
Rank and Status for Veterinary Drugs
2004 FSIS NRP, Domestic Scheduled Sampling

Rank	Drug	Score	Status in the 2005 NRP
9	Dipyrone (NSAID)	7.9	NIP
10	Dexamethasone (glucocorticoid)	7.2	NIP
11	Thiamphenicol (chloramphenicol derivative)	7.0	NIP
12	Methyl prednisone (glucocorticoid)	6.9	NIP
13	Arsenicals (detected as As)	6.8	NIP NIP
14	Berenil (antiprotozoal)	6.7	Domestic Scheduled Sampling: Not scheduled for 2005 Imported: Not scheduled for 2005
15	Prednisone (glucocorticoid)	6.0	NIP
16	Etodolac (NSAID)	5.8	NIP
17	Flunixin (NSAID)	5.8	Domestic Scheduled Sampling: Not scheduled for 2005 Imported: Not scheduled for 2005
18	Amprolium (coccidiostat)	5.8	NIP
19	Eprinomectin (avermectin)	5.3	NIP
20	Lasalocid (coccidiostat)	5.1	NIP
21	Clorsulon (anthelmintic, Trematodes)	4.9	NIP
22	Benzimidazoles in FSIS MRM (thiabendazole and its 5-hydroxythiabendazole metabolite, albendazole 2-animosulfone metabolite, benomyl in the active hydrolyzed form carbendazim, oxfendazole, mebendazole, cambendazole, and fenbendazole) (anthelmintics)	4.6	NIP
23	Halofuginone (antiprotozoal, coccidiostat)	4.6	NIP
24	Hormones, naturally-occurring (17-estradiol, testosterone, and progesterone)	4.5	NIP
25	Levamisole (anthelmintic)	3.5	NIP
26	MGA (hormone, synthetic)	3.3	Domestic Scheduled Sampling: 300 samples are scheduled for heifers. Imported: Not scheduled for 2005
27	Ractopamine (beta agonist)	3.0	Domestic Scheduled Sampling: 230, 90, and 90 samples are scheduled for steers, formula-fed veal, and market hogs Imported: Not scheduled for 2005
28	Nicarbazin (coccidiostat)	3.0	NIP
29	Morantel and pyrantel (anthelmintic)	2.9	NIP
30	Veterinary tranquilizers (azaperone and its metabolite azaperol, xylazine, haloperidol, acetopromazine, propionylpromazine, and chlorpromazine)	2.6	

*FDA has not set a tolerance for the following sulfonamides: sulfapyridine, sulfadiazine, sulfadoxine, sulfamethoxypyridazine, sulfisoxazole, sulfacetamide, sulfamethoxazole, sulfamethizole, sulfanilamide, sulfaguanidine, sulfasalazine, sulfaphenazole, and sulfatroxazole.

Table 2B - *continued*
Rank and Status for Veterinary Drugs
2004 FSIS NRP, Domestic Scheduled Sampling

Key:
MRM = Multiresidue method
CHC/COP = Chlorinated hydrocarbon/chlorinated organophosphate
NIP = Not included in 2004 FSIS National Residue Program (NRP)
NSAID = Non-steroidal anti-inflammatory drug
FDA-NCTR = Food and Drug Administration, National Center for Toxicological Research, Jefferson, AR.

In the second column, where multiple compounds have been grouped together for analysis or potential analysis by a single MRM, the title of that group has been bolded (e.g., “Antibiotics in FSIS Bioassay MRM”).

Table 3A
Production Classes to be Considered for Each Veterinary Drug/Drug Class
2005 FSIS NRP, Domestic Scheduled Sampling

ERC	Production Class	AMDUCA Drugs			
		Chloramphenicol	*beta*-Agonists (clenbuterol, cimaterol, and salbutamol)	Phenylbutazone (ELISA method)	Phenylbutazone (CHC method)
		--	--	--	--
0.025	Horses				●
0.562	Bulls				●
1.844	Beef cows			○	●
1.667	Dairy cows	●		○	●
8.013	Heifers			○	●
13.629	Steers		●	●	●
0.028	Bob veal	○			
0.136	Formula-fed veal	●	○		●
0.009	Non-formula-fed veal	●			●
0.017	Heavy calves			○	●
0.021	Bison				
0.009	Sheep				●
0.179	Lambs				●
0.032	Goats				●
18.544	Market hogs		○		●
0.011	Roaster pigs				●
0.057	Boars/Stags				●
1.001	Sows				●
43.790	Young chickens	●			●
0.815	Mature chickens	●			●
7.009	Young turkeys	●			●
0.081	Mature turkeys	●			●
0.159	Ducks				
0.003	Geese				
>0.01	Squab				
0.007	Ratites				
0.002	Rabbits				
2.352	Egg products				⭘

Table 3B
Production Classes to be Considered for Each Veterinary Drug/Drug Class
2005 FSIS NRP, Domestic Scheduled Sampling

ERC	Production Class	Drug and Priority Rating				
		Antibiotics 15.0	Arsenicals 6.8	Avermectins 14.0	Carbadox 12.4	Florfenicol 10.1
0.025	Horses	■		■		
0.562	Bulls	■		●		
1.844	Beef cows	●	■	■		
1.667	Dairy cows	●		■		●
8.013	Heifers	●		■		
13.629	Steers	■		■		
0.028	Bob veal	●		■		
0.136	Formula-fed veal	●		■		●
0.009	Non-formula-fed veal	●		●		●
0.017	Heavy calves	●		●		
0.021	Bison	■		■		
0.009	Sheep	■		●		
0.179	Lambs	■		●		
0.032	Goats	■	■	●		
18.544	Market hogs	■	■	■	●	
0.011	Roaster pigs	●	■	■	○	
0.057	Boars/Stags	■	■	■		
1.001	Sows	●	■	■		
43.790	Young chickens	■	■			
0.815	Mature chickens	■	■			
7.009	Young turkeys	■	■			
0.081	Mature turkeys	■	■			
0.159	Ducks	■	■			
0.003	Geese	■	■			
>0.01	Squab	■				
0.007	Ratites	■		■		
0.002	Rabbits	■				
2.352	Egg products	○	■			

Table 3B - *continued*
Production Classes to be Considered for Each Veterinary Drug/Drug Class
2005 FSIS NRP, Domestic Scheduled Sampling

ERC	Production Class	Drug and Priority Rating					
		Melengestrol Acetate (MGA)	Ractopamine	Sulfonamides	Thyreostats	Trenbolone	Zeranol
		3.3	3.0	12	8.5	10.1	9.0
0.025	Horses			■			
0.562	Bulls			●			
1.844	Beef cows			●			
1.667	Dairy cows			●			
8.013	Heifers	●	○	■	●		
13.629	Steers	○	●	●	●		
0.028	Bob veal			●			
0.136	Formula-fed veal	○	●	●		●	●
0.009	Non-formula-fed veal	○		●		○	○
0.017	Heavy calves			●		○	○
0.021	Bison			■			
0.009	Sheep			■			
0.179	Lambs			●			
0.032	Goats			■			
18.544	Market hogs		●	●			
0.011	Roaster pigs		○	●			
0.057	Boars/Stags			●			
1.001	Sows			■			
43.790	Young chickens			■			
0.815	Mature chickens			■			
7.009	Young turkeys		○	■			
0.081	Mature turkeys			●			
0.159	Ducks			■			
0.003	Geese			■			
>0.01	Squab			■			
0.007	Ratites			■			
0.002	Rabbits			■			
2.352	Egg products			■			

Table 3B - *continued*
Production Classes to be Considered for Each Veterinary Drug/Drug Class
2005 FSIS NRP, Domestic Scheduled Sampling

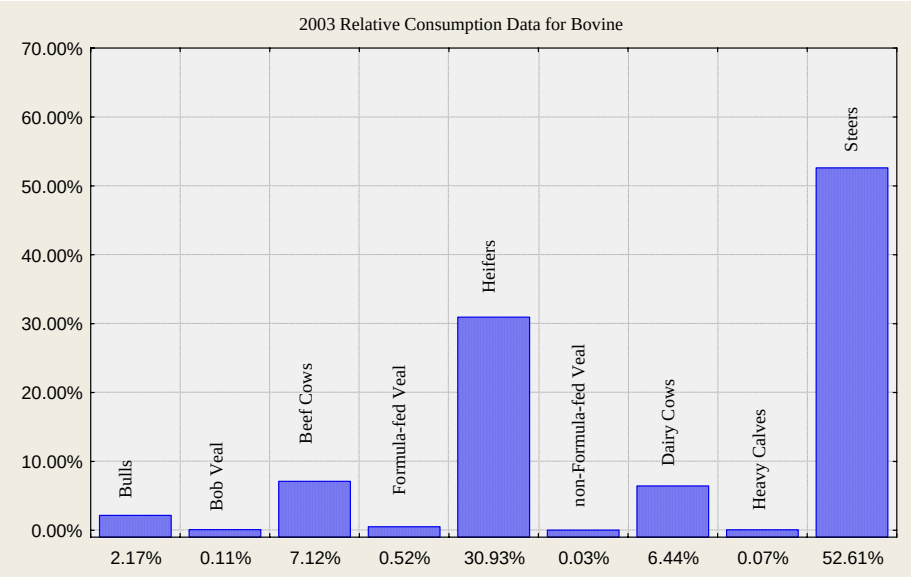
Key:
ERC = Estimated relative percent of domestic consumption, calendar year 2003. This was derived by estimating the total annual U.S. domestic production (pounds dressed weight) for each production class, and dividing by the total poundage for all production classes on this list (see Table 4.4).
● = Scheduled for sampling under the 2005 FSIS NRP
○ = Of potential regulatory concern, but not be sampled under the 2005 FSIS NRP
O = Not of regulatory concern, but sampled anyway because comes through during CHC/COP method
■ = FSIS has suspended scheduled sampling for this drug/production class pair in 2005.

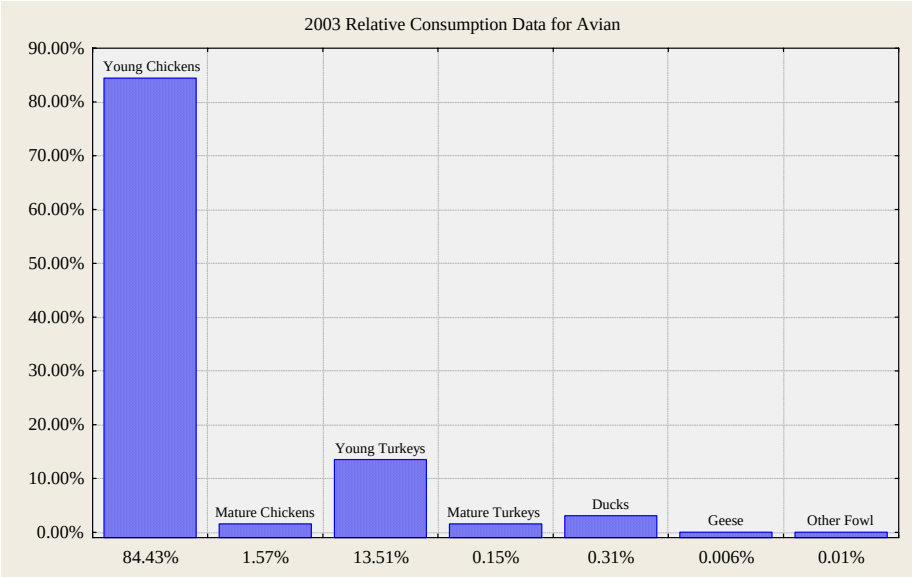
Table 4
Estimated Relative Consumption, Domestically Produced Meat, Poultry, and Egg Products
2005 FSIS NRP, Domestic Scheduled Sampling Plan

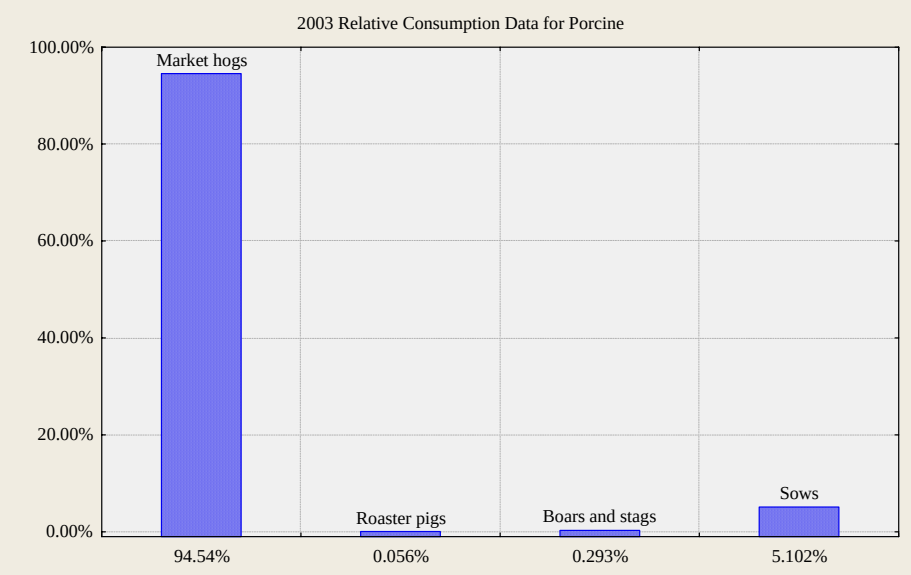
Production Class	Number of Head Slaughtered	Pounds per Animal (dressed weight)	Total Pounds (dressed weight)	Percent Estimated Relative Consumption
Bulls	629,000	904	568,616,000	0.562
Beef cows	3,163,000	590	1,866,170,000	1.844
Dairy cows	2,860,000	590	1,687,400,000	1.667
Heifers	11,078,200	732	8,109,242,400	8.013
Steers	17,177,000	803	13,793,131,000	13.629
Bob veal	382,692	75	28,701,900	0.028
Formula-fed veal	561,716	245	137,620,420	0.136
non-Formula-fed veal	26,036	350	9,112,600	0.009
Heavy calves	42,776	400	17,110,400	0.017
Subtotal, Cattle	**35,920,420**		**26,217,104,720**	**25.905**
Market hogs	96,242,000	195	18,767,190,000	18.544
Roaster pigs	160,000	70	11,200,000	0.011
Boars/Stags	241,200	241	58,129,200	0.057
Sows	3,215,300	315	1,012,819,500	1.001
Subtotal, Swine	**99,858,500**		**19,849,338,700**	**19.613**
Sheep	143,000	66	9,438,000	0.009
Goats	646,954	50	32,347,700	0.032
Lambs	2,662,000	68	181,016,000	0.179
Subtotal, Ovine	**3,451,954**		**222,801,700**	**0.220**
Horses	50,062	500	25,031,000	0.025
Bison	34,804	610	21,230,440	0.021
Total, All Livestock	**139,315,740.00**		**46,335,506,560**	**45.7839**
Young chickens	8,536,865,000		44,317,531,000	43.790
Mature chickens	147,569,000		824,973,000	0.815
Young turkeys	264,753,000		7,093,431,000	7.009
Mature turkeys	3,028,000		81,480,000	0.081
Ducks	24,301,000		160,871,000	0.159
Geese	215,109		3,014,303	0.003
Other fowl (include ratites)	8,251,275		6,253,088	0.006
Subtotal, Poultry	**8,984,982,384**		**52,487,553,391**	**51.8627**
Rabbits			1,720,481	0.002
Egg products			2,380,132,000	2.352
GRAND TOTAL, ALL PRODUCTION CLASSES			**101,204,912,432**	**100**

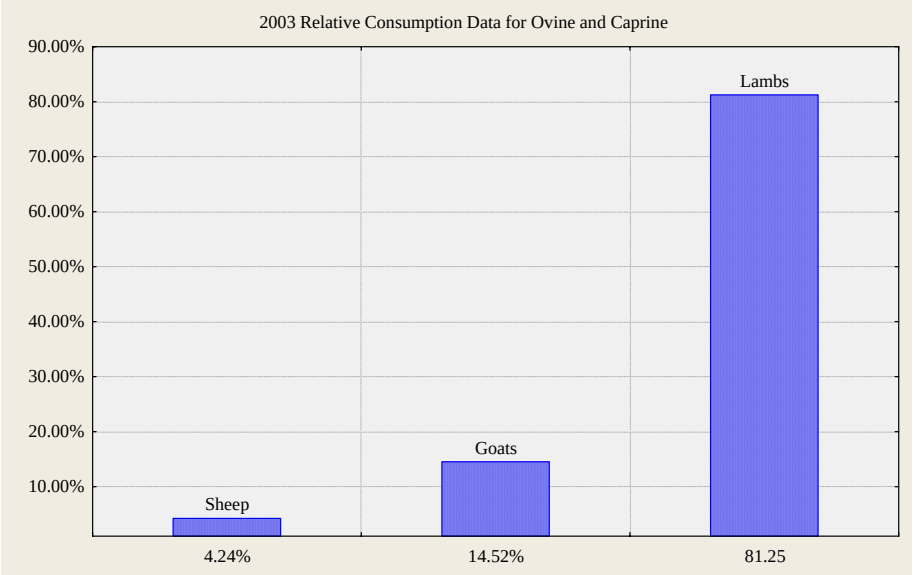
Notes on Table - Sources of data: The numbers in this table were derived from National Agricultural Statistical Service (NASS) data on animals (and egg products) presented for slaughter (or processing) in federally inspected establishments, for calendar year 2003 (CY '03), with the exception of the numbers for veal and calves, which were obtained from the FSIS Automated Data Reporting System. **Livestock:** For livestock, NASS does not provide figures for total pounds dressed weight. Therefore, CY '03 NASS figures for number of head slaughtered were multiplied by CY '03 NASS values for average pounds dressed weight per animal (where indicated by square brackets, the latter was unavailable and estimates were used instead), to calculate total pounds dressed weight. **Poultry, rabbits, and egg products:** For these production classes, figures for total pounds dressed weight, CY '03, were available from NASS, and it was therefore not necessary to calculate them from the number of head slaughtered. **Purpose:** The purpose of this table is to estimate, for each individual production class for which FSIS has regulatory responsibility, the amount of domestically-produced product consumed relative to the total for all of these production classes. This was estimated by assuming that the relative amount of each production class consumed would be approximately proportional to the total poundage (based on dressed weight) of each production class presented for slaughter or processing in federally inspected establishments. Dressed weight, which represents the weight of the carcass after hide, hoof, hair, and viscera have been removed, was used instead of live weight, because the former was thought to be more closely representative of total pounds consumed. *Note: this table estimates the amount of domestically produced product that is consumed, regardless of who consumes it (i.e., no distinction is made between domestically produced product consumed domestically, vs. that which is exported).*

Chart I
Relative Consumption data for Bovine, Porcine, Ovine and Caprine, and Avain









Graph II

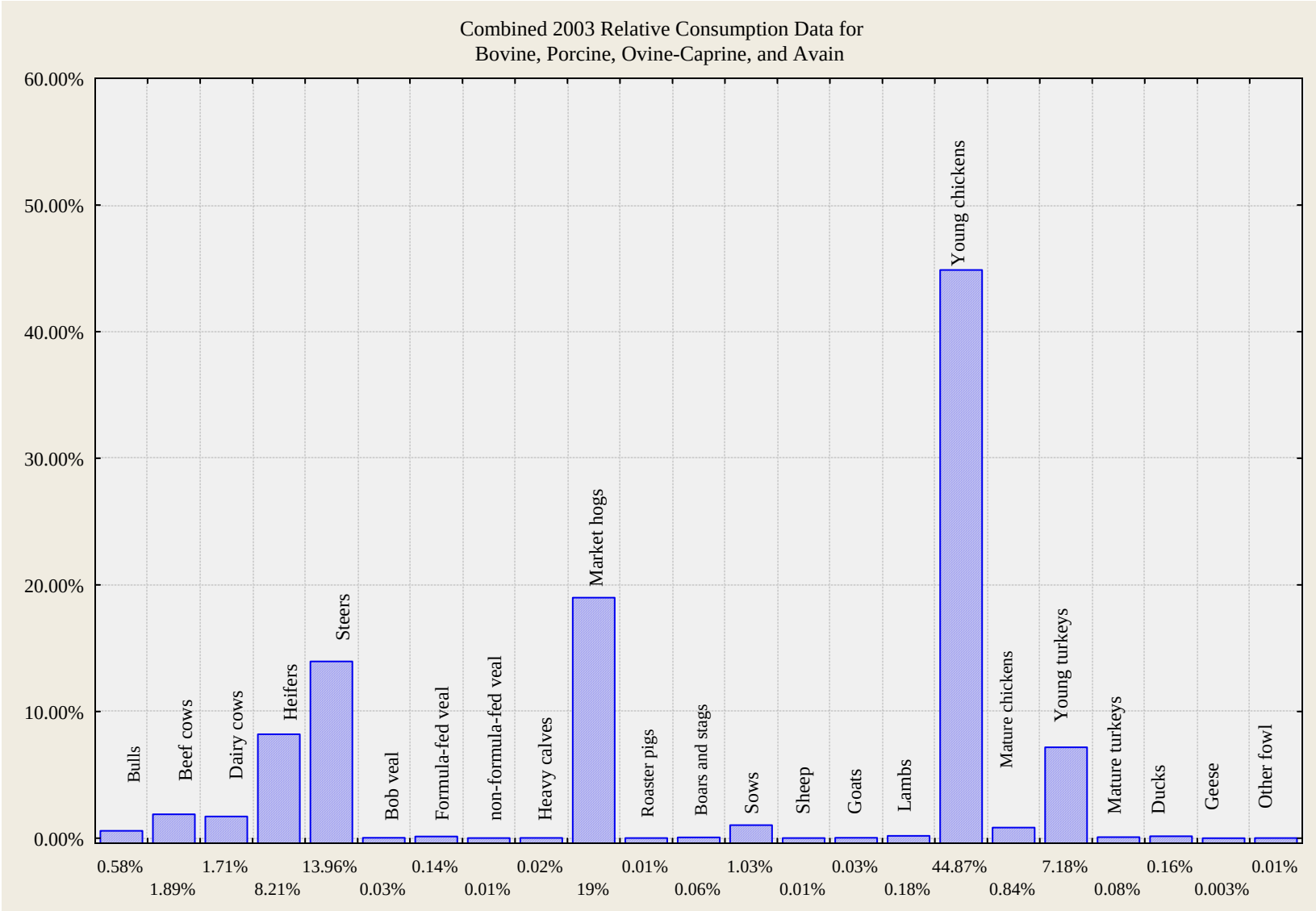

Combined 2003 Relative Consumption Data for
Bovine, Porcine, Ovine-Caprine, and Avain
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
Bulls
Beef cows
Dairy cows
Heifers
Steers
Bob veal
Formula-fed veal
non-formula-fed veal
Heavy calves
Market hogs
Roaster pigs
Boars and stags
Sows
Sheep
Goats
Lambs
Young chickens
Mature chickens
Young turkeys
Mature turkeys
Ducks
Geese
Other fowl
0.58%
1.89%
1.71%
8.21%
13.96%
0.03%
0.14%
0.01%
0.02%
19%
0.01%
0.06%
1.03%
0.01%
0.03%
0.18%
44.87%
0.84%
7.18%
0.08%
0.16%
0.003%
0.01%

Table 5
Veterinary Drug Compound/Production Class Pairs,
Sorted by Sampling Priority Score
2005 FSIS NRP, Domestic Scheduled Sampling Plan

Rank	Compound Class	Compound Priority Rating (P)	Production Class	Relative Percent Consumption in 2002 (C)	Priority Score (P * C)	Unadjusted Number of Samples
1	Antibiotic	15	Young chickens	43.790	656.849	460
2	Sulfonamides	12	Young chickens	43.790	525.479	460
3	Antibiotic	15	Market hogs	18.544	278.156	460
4	Avermectins	14	Market hogs	18.544	259.613	460
5	Carbadox	12.4	Market hogs	18.544	229.943	460
6	Sulfonamides	12	Market hogs	18.544	222.525	460
7	Antibiotic	15	Steers	13.629	204.434	460
8	Avermectins	14	Steers	13.629	190.805	460
9	Sulfonamides	12	Steers	13.629	163.547	460
10	Antibiotic	15	Heifers	8.013	120.190	460
11	Avermectins	14	Heifers	8.013	112.178	460
12	Antibiotic	15	Young turkeys	7.009	105.135	460
13	Sulfonamides	12	Heifers	8.013	96.152	460
14	Thyreostats	4.5	Steers	13.629	61.330	300
15	Ractopamine	3.0	Market hogs	18.544	55.631	300
16	Melengestrol acetate (MGA)	3.3	Steers	13.629	44.975	300
17	Ractopamine	3.0	Steers	13.629	40.887	300
18	Thyreostats	4.5	Heifers	8.013	36.057	300
19	Avermectins	14	Egg products	2.352	32.925	300
20	Sulfonamides	12	Egg products	2.352	28.222	300
21	Antibiotic	15	Beef cows	1.844	27.659	300
22	Melengestrol acetate (MGA)	3.3	Heifers	8.013	26.442	300
23	Avermectins	14	Beef cows	1.844	25.815	300
24	Antibiotic	15	Dairy cows	1.667	25.010	300
25	Ractopamine	3.0	Heifers	8.013	24.038	300
26	Avermectins	14	Dairy cows	1.667	23.342	300
27	Sulfonamides	12	Beef cows	1.844	22.127	300
28	Zeranol	9	Egg products	2.352	21.166	300
29	Ractopamine	3.0	Young turkeys	7.009	21.027	300
30	Sulfonamides	12	Dairy cows	1.667	20.008	300
31	Florfenicol	10.1	Dairy cows	1.667	16.840	300
32	Antibiotic	15	Sows	1.001	15.011	300
33	Avermectins	14	Sows	1.001	14.011	300
34	Berenil	6.7	Beef cows	1.844	12.354	300
35	Antibiotic	15	Mature chickens	0.815	12.227	300
36	Sulfonamides	12	Sows	1.001	12.009	300
37	Berenil	6.7	Dairy cows	1.667	11.171	300
38	Sulfonamides	12	Mature chickens	0.815	9.782	300
39	Antibiotic	15	Bulls	0.562	8.428	300

Table 5 - *continued*
Veterinary Drug Compound/Production Class Pairs,
Sorted by Sampling Priority Score
2005 FSIS NRP, Domestic Scheduled Sampling Plan

Rank	Compound Class	Compound Priority Rating (P)	Production Class	Relative Percent Consumption in 2002 (C)	Priority Score (P * C)	Unadjusted Number of Samples
40	Avermectins	14	Bulls	0.562	7.866	300
41	Melengestrol acetate (MGA)	3.3	Egg products	2.352	7.761	300
42	Sulfonamides	12	Bulls	0.562	6.742	300
43	Antibiotic	15	Lambs	0.179	2.683	230
44	Avermectins	14	Lambs	0.179	2.504	230
45	Sulfonamides	12	Lambs	0.179	2.146	230
46	Antibiotic	15	Formula-fed veal	0.136	2.040	230
47	Avermectins	14	Formula-fed veal	0.136	1.904	230
48	Sulfonamides	12	Formula-fed veal	0.136	1.632	230
49	Florfenicol	10.1	Formula-fed veal	0.136	1.373	230
50	Trenbolone	10.1	Formula-fed veal	0.136	1.373	230
51	Zeranol	9	Formula-fed veal	0.136	1.224	230
52	Antibiotic	15	Mature turkeys	0.081	1.208	230
53	Sulfonamides	12	Mature turkeys	0.081	0.966	230
54	Antibiotic	15	Boars/Stags	0.057	0.862	230
55	Avermectins	14	Boars/Stags	0.057	0.804	230
56	Sulfonamides	12	Boars/Stags	0.057	0.689	230
57	Antibiotic	15	Goats	0.032	0.479	230
58	Melengestrol acetate (MGA)	3.3	Formula-fed veal	0.136	0.449	230
59	Avermectins	14	Goats	0.032	0.447	230
60	Antibiotic	15	Bob veal	0.028	0.425	230
61	Ractopamine	3.0	Formula-fed veal	0.136	0.408	230
62	Avermectins	14	Bob veal	0.028	0.397	230
63	Sulfonamides	12	Goats	0.032	0.384	230
64	Sulfonamides	12	Bob veal	0.028	0.340	230
65	Antibiotic	15	Heavy calves	0.017	0.254	230
66	Avermectins	14	Heavy calves	0.017	0.237	230
67	Sulfonamides	12	Heavy calves	0.017	0.203	230
68	Trenbolone	10.1	Heavy calves	0.017	0.171	90
69	Antibiotic	15	Roaster pigs	0.011	0.166	90
70	Avermectins	14	Roaster pigs	0.011	0.155	90
71	Zeranol	9	Heavy calves	0.017	0.152	90
72	Antibiotic	15	Sheep	0.009	0.140	90
73	Carbadox	12.4	Roaster pigs	0.011	0.137	90
74	Antibiotic	15	Non-formula-fed veal	0.009	0.135	90
75	Sulfonamides	12	Roaster pigs	0.011	0.133	90
76	Avermectins	14	Sheep	0.009	0.131	90
77	Avermectins	14	Non-formula-fed veal	0.009	0.126	90
78	Sulfonamides	12	Sheep	0.009	0.112	90

Table 5 - *continued*
Veterinary Drug Compound/Production Class Pairs,
Sorted by Sampling Priority Score
2005 FSIS NRP, Domestic Scheduled Sampling Plan

Rank	Compound Class	Compound Priority Rating (P)	Production Class	Relative Percent Consumption in 2002 (C)	Priority Score (P * C)	Unadjusted Number of Samples
79	Sulfonamides	12	Non-formula-fed veal	0.009	0.108	90
81	Trenbolone	10.1	Non-formula-fed veal	0.009	0.091	90
82	Florfenicol	10.1	Non-formula-fed veal	0.009	0.091	90
83	Zeranol	9	Non-formula-fed veal	0.009	0.081	90
84	Ractopamine	3.0	Roaster pigs	0.011	0.033	90
85	Melengestrol acetate (MGA)	3.3	Non-formula-fed veal	0.009	0.030	90

Table 6A
Adjusted Number of Analyses for Each Veterinary Drug Compound/Production Class Pair, "Full Resource" Sampling
2005 FSIS NRP, Domestic Scheduled Sampling Plan

CC.	PC.	PS.	NS.[a]	VR. (%) (10 Year)[b]	VR. (%) (3 Year)[b]	UNS.[c]	Adj.[d]	IA.[e]	ALC.	APV.	FA.[f]
Antibiotics	Young chickens	656.849	4,252	0.02	0.00	460		460			0
Antibiotics	Market hogs	278.156	4,737	0.30	0.00	460		460			300
Antibiotics	Steers	204.434	3,884	0.03	0.00	460		460			0
Antibiotics	Heifers	120.190	3,623	0.06	0.08	460		460			460
Antibiotics	Young turkeys	105.135	4,287	0.07	0.00	460		460		-1	0
Antibiotics	Beef cows	27.659	4,013	0.12	0.11	300		300			300
Antibiotics	Dairy cows	25.010	4,978	0.48	0.82	300		300			300
Antibiotics	Sows	15.011	3,990	0.45	0.57	300		300			300
Antibiotics	Mature chickens	12.227	2,886	0.03	0.00	300		300		-1	0
Antibiotics	Bulls	8.428	2,596	0.00	0.00	300		300			0
Antibiotics	Lambs	2.683	3,843	0.10	0.00	230		230			0
Antibiotics	Formula-fed veal	2.040	5,387	0.46	0.28	230		230		-1	90
Antibiotics	Ducks	2.384	3,565	0.08							0
Antibiotics	Mature turkeys	1.208	1,819	0.00	0.00	230		230		-1	0
Antibiotics	Boars/Stags	0.862	2,919	0.24	0.00	230		230			0
Antibiotics	Goats	0.479	2,852	0.07	0.00	230		230			0
Antibiotics	Bob veal	0.425	4,135	1.57	3.37	230	+2	460		-1	300
Antibiotics	Horses	0.371	2,711	5.98							0
Antibiotics	Bison	0.315	62	0.00							0
Antibiotics	Heavy calves	0.254	2,996	0.43	0.53	230		230			230
Antibiotics	Roaster pigs	0.166	626	1.12	0.29	90	+2	300			0
Antibiotics	Squab	0.150	77	0.00							0
Antibiotics	Sheep	0.140	2,448	0.00	0.00	90		90			0
Antibiotics	Non-formula-fed veal	0.135	2,382	0.84	3.04	90	+2	300			300
Antibiotics	Ratites	0.105	181	0.00							0
Antibiotics	Geese	0.045	452	0.00							0
Antibiotics	Rabbits	0.030	1,350	3.11							0
Total Samples			**77,051**			**5,680**		**7,170**			**2,580**

Table 6A - *Continued*
Adjusted Number of Analyses for Each Veterinary Drug Compound/Production Class Pair, "Full Resource" Sampling
2005 FSIS NRP, Domestic Scheduled Sampling Plan

CC.	PC.	PS.	NS.[a]	VR. (%) (10 Year)[b]	VR. (%) (3 Year)[b]	UNS.[c]	Adj.[d]	IA.[e]	ALC.	APV.	FA.[f]
Avermectins	Market Hogs	259.613	2,803	0.00	0.00	460		460			0
Avermectins	Steers	190.805	3,969	0.00	0.00	460		460	1,000		1,000
Avermectins	Heifers	112.178	2,913	0.00	0.00	460		460			0
Avermectins	Beef cows	25.815	3,150	0.13	0.00	300		300			0
Avermectins	Dairy Cows	23.342	2,850	0.11	0.00	300		300			0
Avermectins	Sows	14.011	2,180	0.00	0.00	300		300			0
Avermectins	Bulls	7.866	2,671	0.30	0.34	300		300			300
Avermectins	Lambs	2.504	2,559	0.12	0.22	230		230			230
Avermectins	Formula-fed Veal	1.904	2,442	0.08	0.00	230		230		-1	0
Avermectins	Boars/Stags	0.804	1,321	0.00	0.00	230		230			0
Avermectins	Goats	0.447	2,944	1.15	2.00	230	+1	300			300
Avermectins	Bob Veal	0.397	660	0.00	0.00	230		230		-1	0
Avermectins	Horses	0.346	2,047	0.73	0.82	90		90			0
Avermectins	Bison	0.294	45	0.00	0.00	90		90			0
Avermectins	Heavy Calves	0.237	2,416	0.21	0.17	230		230			230
Avermectins	Roaster Pigs	0.155	433	0.00	0.00	90		90			0
Avermectins	Sheep	0.131	1,818	0.28	1.02	90		90			90
Avermectins	non-Formula-fed veal	0.126	1,414	0.28	0.74	90		90			90
Avermectins	Ratites	0.098	148	0.00	0.00	90		90			0
Total Samples			**38,783**			**4,500**		**4,570**			**2,240**

Table 6A - *Continued*
Adjusted Number of Analyses for Each Veterinary Drug Compound/Production Class Pair, "Full Resource" Sampling
2005 FSIS NRP, Domestic Scheduled Sampling Plan

CC.	PC.	PS.	NS.[a]	VR. (%) (10 Year)[b]	VR. (%) (3 Year)[b]	UNS.[c]	Adj.[d]	IA.[e]	ALC.	APV.	FA.[f]
Sulfonamides	Young Chickens	525.48	3,794	0.11	0.00	460		460			0
Sulfonamides	Market hogs	222.53	3,919	0.51	0.38	460	+1	460			460
Sulfonamides	Steers	163.55	3,204	0.19	0.11	460		460			460
Sulfonamides	Heifers	96.15	3,039	0.03	0.00	460		460			0
Sulfonamides	Young Turkeys	84.11	3,648	0.19	0.00	460		460		-1	0
Sulfonamides	Egg Products	28.22	1,161	0.00	0.00	300	-1	230			0
Sulfonamides	Beef cows	22.13	3,586	0.17	0.24	300		300			300
Sulfonamides	Dairy cows	20.01	3,314	0.27	0.64	300		300			300
Sulfonamides	Sows	12.01	4,087	0.59	0.00	300	+1	460			0
Sulfonamides	Mature Chickens	9.78	2,621	0.00	0.00	300	-1	230		-1	0
Sulfonamides	Bulls	6.74	2,923	0.14	0.11	300		300			300
Sulfonamides	Lambs	2.15	2,840	0.14	0.11	230		230			230
Sulfonamides	Ducks	1.907	2,681	0.04	0.00	90		90			0
Sulfonamides	Formula-fed veal	1.63	3,693	0.19	0.44	230		230		-1	90
Sulfonamides	Mature turkeys	0.97	2,029	0.30	0.41	230		230		-1	90
Sulfonamides	Boars/Stags	0.69	3,231	0.43	0.13	230		230			230
Sulfonamides	Bob veal	0.34	3,948	0.76	1.18	460	+2	460			460
Sulfonamides	Horses	0.297	1,569	0.19	0.00	90		90			0
Sulfonamides	Goats	0.38	2,596	0.19	0.00	230		230			0
Sulfonamides	Bison	0.252	138	0.00	0.00	90		230			0
Sulfonamides	Heavy calves	0.2	2690	0.19	0.55	230		230			230
Sulfonamides	Roaster pigs	0.13	508	0.98	1.23	90	+2	300			300
Sulfonamides	Squab	0.120	51	0.00	0.00	90		230			0
Sulfonamides	Non-formula-fed veal	0.11	2,371	0.67	0.59	90	+1	230			230
Sulfonamides	Sheep	0.11	1,094	0.00	NT	90	-1	90			0
Sulfonamides	Ratites	0.084	82	0.00	0.00	90	+1	230			0
Sulfonamides	Geese	0.036	134	0.75	0.00	90	+2	300			0
Sulfonamides	Rabbits	0.024	369	0.00	NT	90	-1	90			0
Total Samples						**6,750**		**7,290**			**3,680**

Table 6B
Adjusted Number of Analyses for Each Veterinary Drug Compound/Production Class Pair, "Limited Resource" Sampling
2005 FSIS NRP, Domestic Scheduled Sampling Plan

CC.	PC.	PS.	NS.[a]	VR. (%) (10 Year)[b]	VR. (%) (3 Year)[b]	UNS.[c]	Adj.[d]	IA.[e]	ALC.	APV.	FA.[f]
Carbadox	Market hogs	229.943	332	0	0	460		460	300		300
Carbadox	Roaster pigs	0.14	310	1	0.32	90		90			0
Total Samples			**642**			**550**		**550**			**300**

CC.	PC.	PS.	NS.[a]	VR. (%) (10 Year)[b]	VR. (%) (3 Year)[b]	UNS.[c]	Adj.[d]	IA.[e]	ALC.	APV.	FA.[f]
Chloramphenicol	Dairy cows	NA	637	0.00	0.00	45		45	230		230
Chloramphenicol	Formula-fed veal	NA	959	0.00	0.00	90	-1	45	90		90
Chloramphenicol	Non-formula-fed veal	NA	330	0.00	0.00	90	-1	45	90		90
Chloramphenicol	Young chickens	NA	NT	NT	NT	90		230			230
Chloramphenicol	Mature chickens	NA	NT	NT	NT	230		90			90
Chloramphenicol	Young turkeys	NA	NT	NT	NT	90		90			90
Chloramphenicol	Mature turkeys	NA	NT	NT	NT	230		90			90
Total Samples						**865**		**635**			**910**

CC.	PC.	PS.	NS.[a]	VR. (%) (10 Year)[b]	VR. (%) (3 Year)[b]	UNS.[c]	Adj.[d]	IA.[e]	ALC.	APV.	FA.[f]
beta-Agonists	Steers	NA	176	0.00	0.00	300		300			1,000
beta-Agonists	Formula-fed veal	NA	284	0.00	0.00	230		230	230		0
beta-Agonists	Market hogs	NA	381	0.00	0.00	300		300			0
Total Samples			**841**			**830**		**830**			**1,000**

Table 6B - *continued*
Adjusted Number of Analyses for Each Veterinary Drug Compound/Production Class Pair, "Limited Resource" Sampling
2005 FSIS NRP, Domestic Scheduled Sampling Plan

CC.	PC.	PS.	NS.[a]	VR. (%) (10 Year)[b]	VR. (%) (3 Year)[b]	UNS.[c]	Adj.[d]	IA.[e]	ALC.	APV.	FA.[f]
Florfenicol	Dairy cattle	16.840	NT	NT	NT	230		230			230
Florfenicol	Formula-fed veal	1.37	NT	NT	NT	90		90			90
Florfenicol	non-Formula-fed veal	0.09	NT	NT	NT	90		90			90
Total Samples											**410**

CC.	PC.	PS.	NS.[a]	VR. (%) (10 Year)[b]	VR. (%) (3 Year)[b]	UNS.[c]	Adj.[d]	IA.[e]	ALC.	APV.	FA.[f]
Melengestrol acetate (MGA)	Heifers	26.44	451	0.00	0.00	300		300			300
Total Samples						300		460			**300**

CC.	PC.	PS.	NS.[a]	VR. (%) (10 Year)[b]	VR. (%) (3 Year)[b]	UNS.[c]	Adj.[d]	IA.[e]	ALC.	APV.	FA.[f]
Phenylbutazone (ELISA Method)	Steers	NA	NT	NT	NT			90	1,000		1,000
Total Samples								**90**			**1,000**

Table 6B - *continued*
Adjusted Number of Analyses for Each Veterinary Drug Compound/Production Class Pair, "Limited Resource" Sampling
2005 FSIS NRP, Domestic Scheduled Sampling Plan

CC.	PC.	PS.	NS.[a]	VR. (%) (10 Year)[b]	VR. (%) (3 Year)[b]	UNS.[c]	Adj.[d]	IA.[e]	ALC.	APV.	FA.[f]
Ractopamine	Steers	40.887	576	0	135	300		300	230		230
Ractopamine	Formula-fed veal	0.408	NT	NT	NT						90
Ractopamine	Market hogs	55.631	768	0	768	300		300	90		90
Total Samples			**1,344**			**600**		**600**			**410**

CC.	PC.	PS.	NS.[a]	VR. (%) (10 Year)[b]	VR. (%) (3 Year)[b]	UNS.[c]	Adj.[d]	IA.[e]	ALC.	APV.	FA.[f]
Thyreostats	Steers	61.330	NT	NT	NT						300
Thyreostats	Heifers	36.057	NT	NT	NT						300
Total Samples			NT								**600**

CC.	PC.	PS.	NS.[a]	VR. (%) (10 Year)[b]	VR. (%) (3 Year)[b]	UNS.[c]	Adj.[d]	IA.[e]	ALC.	APV.	FA.[f]
Trenbolone	Formula-fed veal	1.373	NT	NT	NT						1,000
Total Samples			**NT**								**1,000**

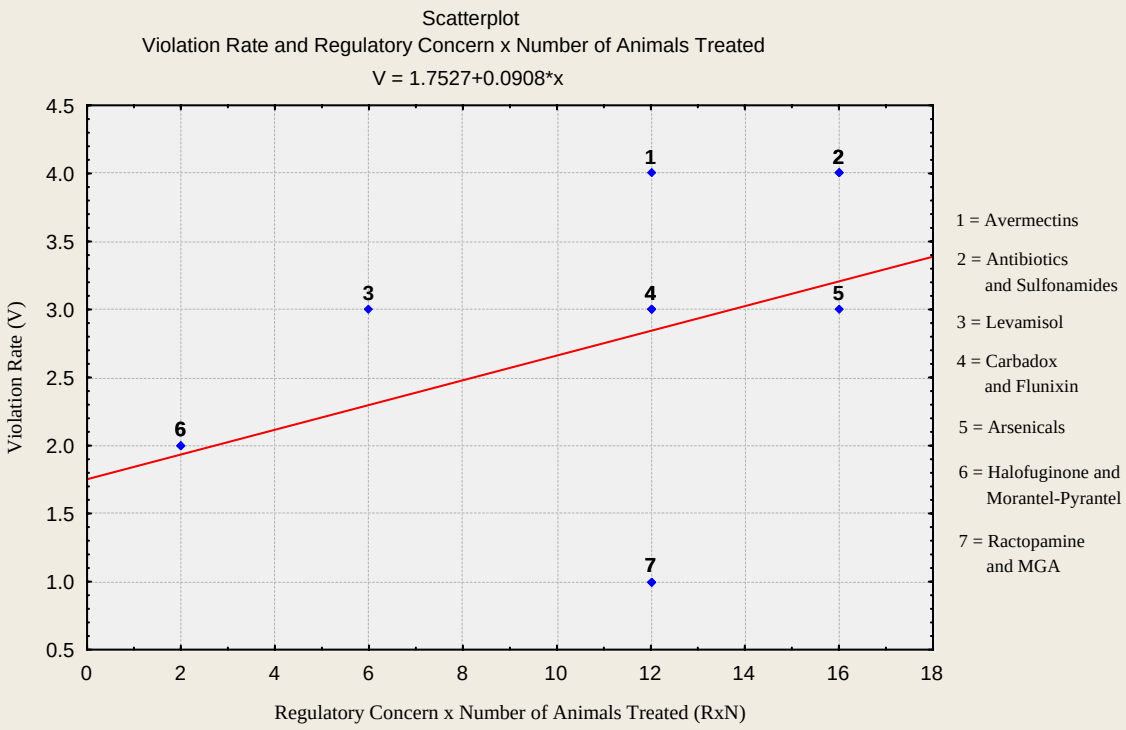
Table 6B - *continued*
Adjusted Number of Analyses for Each Veterinary Drug Compound/Production Class Pair, "Limited Resource" Sampling
2005 FSIS NRP, Domestic Scheduled Sampling Plan

CC.	PC.	PS.	NS.[a]	VR. (%) (10 Year)[b]	VR. (%) (3 Year)[b]	UNS.[c]	Adj.[d]	IA.[e]	ALC.	APV.	FA.[f]
Zeranol	Formula-fed veal	1.224	556	8.09							1,000
Total Samples											**1,000**

a. The total number of samples analyzed in the FSIS Scheduled Sampling Plan (01/01/1994 to 12/31/2003)
b. The percent of samples with residue concentrations exceeding the tolerance or action level (or, for a drug whose use was not permitted in the production class in which it was detected, the percent of samples with any detectable residue)
c. The number obtained from the last column of Table 4.5
d. For a discussion of adjustments to sampling levels (+1, +2, and -1), see the text discussion
e. Number of samples proposed following adjustment for historical violation rate information or lack of testing information
f. Final adjustment numbers were obtained following an assessment of laboratory capacity, production volume, and 3-year violation rate data. FSIS has suspended scheduled sampling for all drugs in horses and minor species (bison, ducks, ratites, geese, rabbits, and squab). FSIS has also suspended scheduled sampling for slaughter classes that have a violation rate of zero for the years 2001-2003.
g. The *beta*-Agonists in the FSIS multiresidue method are: clenbuterol, cimaterol, and salbutamol

Key:
CC. = Compound Class
PC. = Production Class
PS. = Priority Score
NS. = Number of Samples (1994-2003 analyzed by the FSIS Scheduled Sampling Plan (i.e., random sampling only)
VR. (10 Year) = Violation Rate (1994-2003) is the percent of samples with residue concentrations exceeding the tolerance or action level (or, for a drug whose use was not permitted in the production class in which it was detected, the percent of samples with any detectable residue).
VR. (3 Year) = Violation Rate (2001-2003) is the percent of samples with residue concentrations exceeding the tolerance or action level (or, for a drug whose use was not permitted in the production class in which it was detected, the percent of samples with any detectable residue).
UNS. = Unadjusted number of samples, which is obtained from last column of Table 4.7
Adj. = Adjustment based on FSIS Historical Testing Information (refer to text discussion in Section 4); +1 level, +2 levels, -1 level = There are four different sampling levels: 90, 230, 300 and 460. Sampling levels were increased or decreased (e.g., changed from 300 samples to 230 samples) based on the rules described in Section 4.
IA. = Number of samples proposed following adjustment for historical violation rate information or lack of testing information
ALC. = Adjustment for Laboratory Capacity (refer to text discussion in Section 4)
APV. = Adjustment for Production Volume (refer to text discussion in Section 4)
FA. = Final Adjustment. Finalized sample numbers, obtained following adjustments based on production volume, laboratory capacity, and 3 year violation rates
NA = Not applicable
NT = Not tested

Graph III



Regression Equation: V = 1.7527 + 0.0908 * x

r^2 = 0.1803; r = 0.4247, p = 0.1930